



FRIDAY, MAY 9.

CONTENTS.

ILLUSTRATIONS:	PAGE.	EDITORIAL NOTES.....	PAGE.
Outlines and General Dimensions of Standard Express Locomotives in Use in Great Britain.....	317	NEW PUBLICATIONS.....	325
Terminal Station, Mexican National Railroad, (with inset).....	318	GENERAL NEWS:	
Proposed New York & Long Island Railroad, Tunnel and Connections.....	319	Technical.....	321
The Fowler Rolled Steel Wheel.....	320	The Scrap Heap.....	321
Leeds' Cylinder Boring and Facing Machine.....	320	Locomotive Building.....	325
CONTRIBUTIONS:		Car Building.....	325
Long Span Bridges.....	315	Bridge Building.....	325
Brake Shoe Wear on Chilled Wheels.....	315	Meetings and Announcements.....	325
Metal Brake Beams—A Challenge.....	315	Personal.....	326
Easement Curves.....	315	Elections and Appointments.....	327
Civil Engineers and the Public Works.....	315	Railroad Construction.....	328
EDITORIALS:		General Railroad News.....	329
The Senate Bills on Safety Appliances.....	322	Traffic.....	330
Questions for Railroad Commissioners.....	322	MISCELLANEOUS:	
American and English Locomotives.....	323	The Physical Properties of Iron and Steel at High Temperatures.....	316
		Hungarian Railroads.....	317
		The New York & Long Island Railroad Tunnel.....	318
		American and Foreign Railroads.....	318
		American Practice in Block Signaling.....	320

Contributions.

Long Span Bridges.

NEW YORK, May 3, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your list of long span bridges in your issue of May 2, you have omitted the deck arch highway bridge over the Mississippi River, at Minneapolis, Minn., erected in 1888 by the Wrought Iron Bridge Co., of Canton, O., having the longest highway spans, other than suspension, yet erected. This bridge has two deck arch spans 456 ft. long on pin centres, with versed sine of 90 ft. and arches placed 20 ft. apart on centres. The bridge has 18 ft. roadway and 2 ft. 6 in. footways, and, with the iron trestle at each end, has a total length of 1,273 ft.

JOB ABBOTT.

Brake Shoe Wear on Chilled Wheels.

New York Car Wheel Works,
BUFFALO, N. Y., May 5, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the letter on Brake Shoe Wear on Chilled Wheels in your issue of April 25, I would say that we are now engaged in constructing machinery for making tests in regard to the wear of car wheels, and will be able in the near future to give you information on the very question advanced by the writer of the article. Our appliance will record the travel of the car wheel and the amount of wear that will be obtained from contact with the rail or from brake shoe service. A very careful investigation of all the facts that can be procured from present service goes to convince me that very few chilled car wheels are removed from service on account of wear that would reduce the diameter. The great majority of car wheels are removed from service on account of other defects resulting from particular conditions of the service, and which are mainly due to the use of the brake.

P. H. GRIFFIN,
President.

Metal Brake Beams—A Challenge.

Michigan Railway Supply Co.,
DETROIT, MICH., April 28, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is very essential in this age of air brakes to know which is the safest, most reliable and most durable metal brake beam manufactured. To settle this question beyond all reasonable doubt, the Michigan Railway Supply Co., of Detroit, make the following proposition for a practical working test.

We will equip from 25 to 100 cars for any trunk line in the United States with our "Central" steel brake beam, fitted up with any style of brake head, any or all of our competitors to do likewise. The cars are to be placed in active service and an accurate account kept of all repairs of any kind made to any of the brake beams during the first twelve months of service, the cost of repairs to be charged against the beams having such repairs made to them.

At the expiration of twelve months the manufacturers of the beams showing the best results shall be paid the regular selling price of the beams furnished for the test by the manufacturers of the other competing beam or beams, share and share alike.

In case twelve months' service is not long enough to arrive at the result a sufficient additional length of time as decided by the railroad making the test is to be allowed them.

W. A. PUNGS, G. M.

Easement Curves.

Pennsylvania Railroad Co.,
WEST PHILADELPHIA, Pa., May 1, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Allow me to differ with Mr. Willard Beahan in his letter of April 14 on the subject of "Easement Curves."

Mr. Brown in his letter said that easement curves had no place outside of college and the office. Mr. Beahan seems to be of the opposite opinion, and cites a case of an easement curve beginning with a light curve running up to the full degree, thereby reducing the shock about one-half, while he says that, by the method of Mr. Brown, running from a tangent to a 30-minute curve, and from that to a 4-degree curve, he only reduces the shock by one-eighth. This is one point on which I differ from Mr. Beahan, for it would, in my opinion, reduce the shock seven-eighths in place of only one-eighth, as the elevation at the P. C. is nothing, and the curve but slight in reference to the tangent, that the shock is insignificant and the elevation is gradually increased until at the P. C. C. it is the full elevation of the 4 degree; and as all trackmen know, when the shock occurs it is in the line or surface at this point.

Using Mr. Brown's method, a track foreman can keep his track in much better shape than if he had five or six points in the curve to take care of. It is not the time taken in running in the curve that should be saved, but the labor in keeping the curve in good riding condition; for a curve is "rerun" once in about 50 times that it is relined by the trackmen. The curve in question (*Railroad Gazette*, April 4) was, before it was thrown to allow for the present 30-minute curve at each end, very hard to "keep up," beside all trains that stopped at Powelton avenue station had a very ugly place to start; but since this 30-minute curve was added to allow room to raise the elevation gradually in place of the former way of going back on the tangent to begin the elevation, it has very materially decreased the labor on this one curve in particular.

From Mr. Beahan's letter I judge he is a "theoretical engineer," and I would like to ask him if he would have had time to use "theory" in the labor incident to repair the damage caused by the June flood on the Pennsylvania Railroad. Could the time have been spared to allow for this theoretical way of working while a practical man would know from past experience what would be suitable to allow the work to be rushed forward, and trains run on the whole length of the damaged part in about one week after the flood?

ROADMASTER.

["Roadmaster" should not forget that his own road is one of the most striking examples in the world of the work of the theoretical engineer in organization, construction, operation and maintenance. We assume that by theoretical engineer he means one who has had the inestimable advantage of a good technical education. It would be hard to find a finer illustration of the practical value of cultivated brains than was given on the Pennsylvania after the great flood.—EDITOR RAILROAD GAZETTE.]

Civil Engineers and the Public Works.

74 WALL STREET, NEW YORK, May 3, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your short editorial on the report of the Boston Society as to the public works engineering prompts me to inquire what is the present status of the movement for getting civil engineers into a more prominent position in the public service, and exactly what it aims at.

So far as I have followed it, it seemed to aim in a general way at putting the civil branch of the profession on an equal footing with the military one on the public works conducted by the United States Government. I have seen no discussion of ways and means, and the movement, so far as I have happened upon mention of it, had my entire disapproval, for the very reasons stated in the Boston Society's report.

The latter says: "If there is an army, there must be an engineer corps. If there is a war, there must be an army. An engineer corps without experience would be of little value, while it would be impracticable to hold an organization of this character together without giving the officers something to do, and we know of no better occupation than that which they now have."

The employment of civil engineers on the public works is now mainly confined to draughtsmen and a very limited proportion of field engineers in the lower grades, the number of the latter varying as the appropriations made by Congress require more or less help. Their services are required, apart from fortifications, almost entirely on river and harbor improvements, about which, with a few brilliant exceptions like Mr. Eads, no men in the country know more than do the United States engineers.

The working of the department is at least as satisfactory and free from censure as any other government department, and it is difficult to see how the civil engineers could be introduced on a par with the military without leading to endless bickering and dissension. The two branches of the profession have each their own peculiar fields, and live in perfect amity and mutual respect, which would be almost certainly disturbed if

the proposed sharing of the United States public works were carried into effect.

In regard to the position of civil engineers at present on the United States public works, I can testify from two years' very pleasant experience on the Pacific coast that they are better paid than subordinates in other branches and treated with at least as much consideration. The only objection to a young man of ambition is that preferment is very limited. On the other hand, the training in business and the details of engineering practice is nearly as useful as in other branches. I myself have never regretted the two years passed in the service. I feel that the knowledge of the theory and practice of concrete work as carried on by the United States engineers is alone almost worth the whole period.

The only criticism I have to make on the United States engineers is that they get too little discipline in the detail and drudgery of the profession, which is so important for training a man in habits of accuracy and method. The engineer graduate of West Point steps over the position, of draughtsman and instrument man, as a rule (I speak only from my own observation and that of a friend or two). He gets almost immediately a position of considerable responsibility, and misses something in so doing. He also misses the sharpening of the wits and the development of energetic habits which come from a man's livelihood being dependent upon his good or bad performance. This latter difficulty I think would not be remedied by the proposed system. The want of practice in the lower grades might be got over by increasing the number of West Point graduates who are put into the engineers, and employing fewer instead of more civil assistants.

I confess that I have made no systematic attempt to follow the movement, and since your editorial points to the working out of a definite scheme I should be glad, as I said at the beginning, of references to the proper documents for enlightenment.

One thing repelled me about it at the very outset. This was that it seemed to be largely a scheme for enabling the profession to get some government pay instead of relying upon the brains and energy which have made it in the United States, if not as scientific, at least as successful as in any other country in the world, in utilizing and fighting our great friend and enemy, nature and her forces.

W. HOWARD WHITE.

[We do not know whether or not the Council of Engineering Societies on National Public Works is still in existence, but Mr. White can find out what has been done in recent years, by the "Council" and by others, by addressing Mr. L. E. Cooley, 171 La Salle street, Chicago, Ill.—EDITOR RAILROAD GAZETTE.]

Diagrams of Standard English Express Locomotives.

BY CHARLES R. KING.

It may easily be believed that a more than ordinary interest is being taken by American engineers, since the visit of many of their members to England last year, in the locomotive practice of that country. The frequent articles in all American journals on the subject is some proof of that; but many of them are not correct. Some of them are decidedly misleading to those who are not well versed in European matters. Fancy taking the London & Northwestern as a typical example of an English railroad! True it is the most powerful and extensive, but its engines, cars, trucks and arrangements generally are about 20 years behind the times (save the compound locomotive system).

The main object of this communication is to give all interested in locomotive engineering a concise statement of the very best locomotive practice of English roads at the present day, so that the leading features of the designs and the principal dimension may be seen at a glance.

There are nine main lines having depots in London, which show widely varying types of engines, and eight roads beyond the metropolis connecting with the London lines. The class of engine most used on each of these roads is given here with the exception of the Midland and Caledonian, which are generally coupled engines, but those shown (singles) are the latest type.

Attention is called to the domeless engines of the Great Northern and Great Western—the two first-rate high-speed lines of the country—one running through crowded districts and a labyrinth of lines over hilly country, and the other on a straight, level and solid road, with few connections and scarcely one tunnel in 70 miles, and sometimes using the 7-ft. gauge. Coal consumption averages 23 to 28 lbs. per mile on these lines, and smoke is avoided by the firemen keeping a thin fire in the centre and heaped up around the walls—basin shape—frequent firing, looking out for an opportunity at the foot of an ascending grade or in crossing bleak and unprotected plains; but never firing when standing in a station.

Mr. A. G. Smith, in his paper "Main Features of English

* For the diagrams the compiler of the sheet is indebted to a small pamphlet and plans by Engineer T. West, of the North-eastern Works, Darlington, which, besides giving over 300 typical examples of old and modern British and Irish locomotives, devotes much remark and 50 scale diagrams to the American locomotive from its infancy to recent times.

Locomotive Practice," first appearing in "Stevens' Indicator," see *Railroad Gazette*, gives many useful notes regarding the matter, but some points need correction if considered as applying to the greater portion of British railroads, and this will be noted in the following:

Crank axles are of iron, as well as steel, and are much approved by some; the throws, or cranks, are forged, and a finished axle is said to cost a sum of money that would go a good way toward a \$12,500 engine. Spring equalizers are seldom used to distribute the weight on drivers for inside cylinder coupled engines; still, they do exist on many engines. So long ago as 1853 the North London used to apply these levers between 63-in. drivers of inside cylinder passenger engines.

The lagging, or "cleading," as it is often called, is not so often of asbestos or mineral cotton as of wood. Slag-wool or silicate cotton was tried at the Northeastern Company's shops at Darlington and soon abandoned for the old cleading. Cabs have round glass windows to open at will, but ventilators are provided to make it unnecessary; others have doors at the sides of fire-box, but these cabs are necessarily much more cumbersome. To provide seats so that the driver could sit down at his work would be an imputation against his activity and an inducement to negligence while running.

Sand boxes that have not an ejector on their pipes are behind the day; all progressive English, French and Italian lines have the Gresham & Craven steam blast attached to sand pipes. Flanges of drivers are sometimes lubricated by vapor or oil-pads. Speed indicators are used by some. Reversing is effected by a variety of devices.

American engineers do not see the uses for the amount of polished steel and burnished brass and elaborate painting of English engines. To know the reason one must understand the British public to whom the companies cater, and know that the English general traveling public are proud of the engines that pull the trains in which they ride, and that small crowds watch the starting and arrival of the most important express engines in the fashionable depots, hence the peculiar custom of making the engines as well as the cars such examples of the painter's work. Painters have a rule to paint boiler framing and wheels three contrasting colors, always keeping the wheels the darkest hue. Here are the prevailing colors in due order as most commonly used on various roads: 1, emerald green to sea green; 2, black; 3, claret color; 4, yellow or gambage and iron ore color; 5, deep violet (G. E. R.); 6, ultramarine blue. Striping is done with all the taste of brougham painters. Cars, where painted, have white upper panels and roof, purple or brown lower panels, and the best cars (Gt. Northern) have the natural wood in the wheel centres polished.

The Physical Properties of Iron and Steel at Higher Temperatures.

In Notes on the Construction of Ordnance, No. 50 (Ordnance Bureau, U. S. A.), Mr. Jas. E. Howard, C. E., of Watertown Arsenal, has given the results of a series of very interesting and important tests on the behavior of iron and steel when subjected to stress at temperatures above the normal.

The first series of tests noted has reference to the determination of the value of the coefficient of expansion, and is presented in tabular form, showing the chemical composition of the steel, and the coefficient of expansion per degree Fahrenheit per unit of length for bars varying in hardness from .09 carbon to 1.31 carbon, also a coefficient for wrought iron, and one for gun cast iron. The values of the coefficients were obtained from direct measurement, through a range of temperature of about 210 degrees, noted with mercurial thermometers, and the figures given are probably the latest and most trustworthy on the subject. The tabulated results show a maximum coefficient for wrought iron and a minimum for cast iron; steel coming in between in the order of hardness. A few of the determinations are as follows:

Material.	Coefficient of expansion per degree Fahrenheit per unit of length.
Wrought-iron.....	.0000673/2
Mild steel (carbon .09).....	.000067361
Medium " " " .51.....	.000066202
Hard " " " .97.....	.000066170
High " " " 1.31.....	.000066178
Cast iron (gun).....	.000059261

Averaging Mr. Howard's results, we can take for very close approximations the following figures for general application:

Material.	Coefficient per degree Fahrenheit per unit of length.
Wrought iron.....	.0000665; for structural and boiler steels having carbon .30 and under.
Mild steel.....	.0000655; for axles, rails and tires having carbon .3 to 1.
Hard steel.....	.0000655
Cast iron.....	.0000595

Measurements on bars which had been repeatedly heated and cooled, and quenched from bright cherry red heat in oil and water, showed that a very marked effect was produced by this treatment, the bars being permanently shortened and their coefficient of expansion raised, the amount of change being greater in the case of the higher carbon steels and when quenched in water. Careful annealing restored the bars to their normal expansion,

EXAMPLES OF STANDARD EXPRESS LOCOMOTIVES ENGLAND AND SCOTLAND.

The table following and the diagrams shown on the facing page are from a card got up by Mr. C. R. King, of 10 Rue de Bagneux, Paris, France, author of "Forty Years of Locomotive Building on a Great French Road," now appearing in *The Engineer*, of London. Mr. King says that he will guarantee the table correct to every figure and every remark.

Reference number.	Cylinders.	Total heating surface in square feet.	Weight (2,000 lbs. to 1 ton in tons).	Speed, average rate booked; Miles per hour.	Designer (locomotive superintendent), and shop's location.	Remarks.	Line.
1	18 x 28 in.....	1,190	45½	54½ M. P. H. for 50½m., and 54 M. P. H. for 105¼m.	P. Stirling (Doncaster).	Speed in August, 1888 (official), was 105 min. for 105¼ miles (delays included), and 90 min. for 83¼ miles, with these engines.	Great Northern (King's Cross).
2	18 x 26 in.....	1,261	47¼	52½ M. P. H. for 51¼m.	S. W. Johnson (Derby).	Was exhibited at Paris, 1889.	Midland (St. Pancras)
3	18½ x 26 in.....	1,110	43¾	.....	P. Stirling (Doncaster).	Third class cars on this road compare well with the P. R. R.'s first; spacious, well lighted, luxurious upholstery and the electric light.	Great Northern.
4	18 x 26 in.....	1,150	40	53¼ M. P. H. for 77¼m.	W. Dean (Swindon)....	Narrow (4 ft. 8½ in.) gauge.	Great Western (Pad dington).
5	H. P. 18 x 24 in. L. P. 26 x 24 in.	1,323	48	52 M. P. H. for 44¼m.	T. W. Worsdell (Gateshead).	Compound; two cylinders; Joy's valve gear.	Northeastern (York).
6	18 x 24 in.....	1,751	46¾	.....	W. Dean (Swindon)....	Broad gauge (7 ft.).	Great Western.
7	18 x 26 in.....	1,130	47¾	.....	M. Holmes (Cowlares, Glasgow).	The same type, where compounded, have H. P. cylinders 13 x 24 in. and L. P. 20 x 24 in.	North British (Edinburgh).
8	18 x 24 in.....	.....	51¾	50½ M. P. H. for 77¼m.	W. Adams (Nine Elms, London).	.....	London & Southwestern (Waterloo).
9	17½ x 26 in.	1,036	41	.....	J. Manson (Kitty Brewster, Aberdeen).	.....	Great North of Scotland (Aberdeen)
10	H. P. 18 x 24 in. L. P. 26 x 24 in.	1,200	40¾	48¾ M. P. H. for 38m.	T. W. Worsdell (Stratford, London).	Compound; two cylinders; Joy's gear.	Great Eastern (Liverpool St.).
11	18 x 24 in.....	1,142	47¾	.....	D. Jones (Inverness).	.....	Highland (Inverness).
12	18½ x 26 in.....	1,485	42¾	46¾ M. P. H. for 50½m.	W. Stroudley (Brighton)	This engine was shown at the 1889 Paris Exhibition.	London, Brighton & South Coast (Victoria).
13	H. P. 14 x 24 in. L. P. 30 x 24 in.	1,242	50	53¼ M. P. H. for 75¼m.	F. W. Webb (Crewe)....	Compound (three cylinders), of the "Pennsylvania" type.	London & Northwestern (Euston).
14	19 x 26 in.....	1,020	46	46½ M. P. H. for 54¼m.	J. Stirling (Ashford)....	Fitted with water-cylinder steam reverse gear (Stirling's); exhibited at Paris Exhibition.	London & Southeastern (London Bridge)
15	18 x 26 in.....	.....	46	50½ M. P. H. for 100¼m.	D. Drummond (St. Rollox, Glasgow).	Bryce Douglas valve gear; no eccentrics.	Caledonian (Glasgow)
16	17½ x 26 in.....	1,069	46¾	47½ M. P. H. for 74¼m.	W. Kirtley (Wandsworth, London).	.....	London, Chatham & Dover (Holborn).
17	18½ x 26 in.....	1,119	43¾	50½ M. P. H. for 33m.	Hugh Snellie (Glasgow)	.....	Glasgow & Southwestern (Scotland).
18	17½ x 26 in.....	.....	46	.....	W. B. Wright (Manchester).	.....	Lancashire & Yorkshire.
19	17½ x 26 in.....	1,144	45	50 M. P. H. for 50¼m.	C. Sacré, now Thomas Parker (Manchester).	.....	Manchester, Sheffield & Lincolnshire.

or, as Mr. Howard states: "Examination of bars of steel which had been quenched in water from a bright cherry red heat showed these bars to have their coefficient of expansion increased above the normal, materially so for the high-carbon bars." With mild steel this increase was scarcely apparent, but with high steels it reached 17 per cent. This was, however, corrected by annealing.

The effect of stress on iron and steel is to raise the limit of elasticity and increase the tensile strength, but to diminish the ductility—in other words, to harden the metal. The opposite effect is the result of heating, to a certain extent depending upon the amount of heat applied.

The results shown by Mr. Howard in Table IV. of his report agree with previously recorded data, which prove that the modulus of elasticity of both iron and steel decreases with the increase in temperature. The complete investigations made at the Watertown Arsenal show a steady falling off in the value of the modulus of elasticity, with increase in temperature, the change being more marked with low carbons or mild steels. The elastic limit apparently follows close in the wake of the M. of E. and diminishes with increased temperature, the amount of carbon regulating the rate of change.

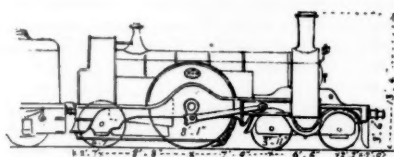
Extensive tensile tests, at temperatures ranging from 70 degrees Fahr. to 2,600 degrees Fahr., furnish useful data regarding the changes in tensile strength and elongation due to heat. Opinions differ as to the particular effect of heat and cold on iron and steel so far as strength is concerned. Those who have had occasion to make drop test on axles are probably fully convinced that a warm axle will stand the test where a cold one of the same iron or steel will fail; in fact, the experiments of Mr. Andrews in England proved that a warm axle was stronger than a cold one, indicating that a decrease in temperature below the normal produced a marked effect in reducing the toughness. On the other hand, tests have been made which showed that "great cold, instead of making iron and steel weak and brittle, seem to have the opposite effect" (experiments of M. K. Styffe, Director of Polytechnic College, Stockholm). However this may be, it is a well-established fact that at certain temperatures above the normal iron and steel show a material increase in tenacity.

The changes which take place with rise in temperature above that of normal, 70 degrees Fahr., are very clearly shown by Mr. Howard, for iron as well as steel. Tests on three varieties of wrought iron show an average maximum gain in tenacity of 20 per cent. at about 500 degrees Fahr. Beyond this temperature the iron steadily weakens. For mild steels the average maximum gain in tenacity is 26 per cent., at about 480 degrees Fahr., and for high carbon steels the maximum gain is about nine per cent. at 500 degrees Fahr.; or for general figures 500 degrees Fahr. is the temperature at which wrought iron and steel have a maximum strength in tension. Between the normal and temperature of 500 degrees there is a point where the tenacity is less than at normal temperature. In other words, iron and

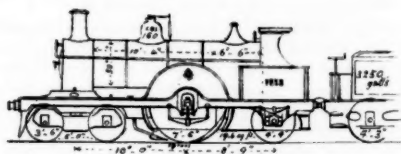
steel lose in strength as heat is increased until a minimum is reached. This is reached in the tests in question, in the case of mild steels at about 200 degrees Fahr. and at about 265 degrees for high steels. Averaging these, we have about 230 degrees as the temperature at which wrought iron and steel show a minimum tensile strength. With increase in temperature from normal up to the point of maximum strength there appears in Mr. Howard's figures no decrease in the tenacity or tensile strength for wrought iron; but the properties of mild steel are so similar to those of wrought iron, it is fair to infer that they follow the same law of variation. Mr. Howard concludes from the results of tensile tests at higher temperature: "From temperature of minimum strength, the bars display greater tenacity with increase of temperature until the maximum is reached, between the temperatures of 400 degrees and 650 degrees Fahr.; and from temperature of maximum strength the tenacity diminishes rapidly with the high carbon bars, somewhat less with mild steels," as the temperatures are increased.

The general impression is that iron and steel increase in ductility with rise in temperature. It appears from the results in question that there is an increase, but a very irregular change, and there is a temperature of maximum ductility, as shown in the elongation before rupture, which closely agrees with the temperature of maximum tenacity. There are also peculiarities in the elongation of bars under stress at high temperatures which are not apparent in tests at normal temperature, namely, "periods of rigidity," in which the elongation is greatly reduced to increase again with further rise in the temperature. These points vary in different bars from 400 degrees Fahr. to 600 degrees Fahr. Commenting on those changes in elongation, Mr. Howard says: "The repetition of these intervals of rigidity and relaxation is suggestive of some remarkable change taking place within the metal in this zone of temperature;" and, further, "observations made on the contractile force developed during cooling from higher temperatures showed the same kind of behavior took place."

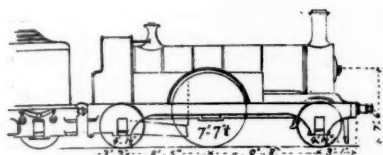
In these tests the contraction of area at fracture varied with the temperature—"the contraction of mild and medium steels is less at 40 degrees Fahr. to 600 degrees Fahr. than at normal temperature. Hard steels showed substantially the same contraction up to 500 degrees Fahr., after which the contraction increases with the temperature." Observations on bars strained at high temperatures for several hours showed a continual flow of the metal, and the results of these observations are summarized as follows: "Generally speaking, the flow caused by stress, which stress does not largely exceed the elastic limit, has a retarding rate of speed, and eventually ceases altogether; whereas under a high stress the rate of flow may accelerate and end in rupture." At normal temperature the rate of speed in testing appeared to have but little effect on the strength. At higher temperatures, above 600 degrees Fahr., the apparent strength of the rapidly fractured bar largely exceeded that of the slowly fractured.



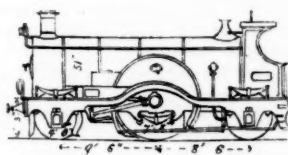
No. 1.



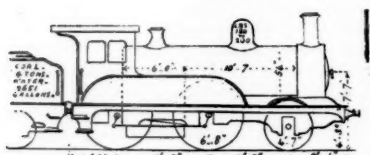
No. 2.



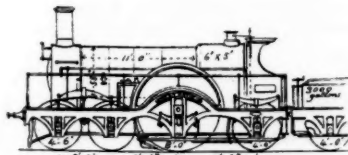
No. 3.



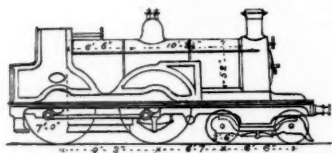
No. 4.



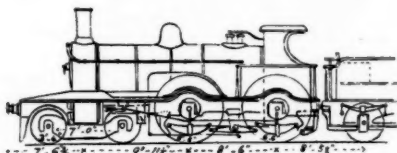
No. 5.



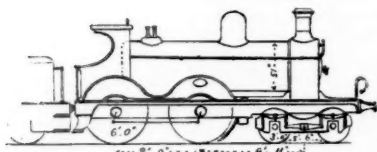
No. 6.



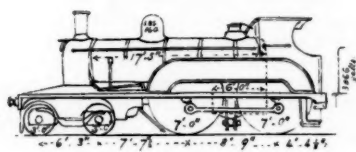
No. 7.



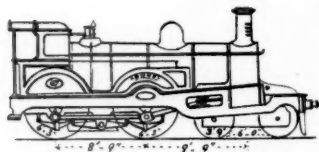
No. 8.



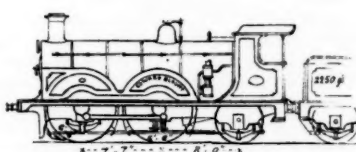
No. 9.



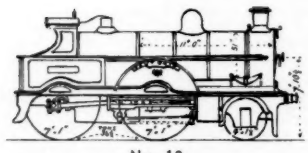
No. 10.



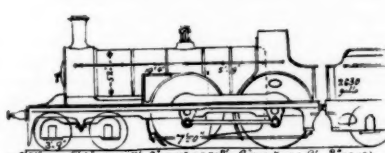
No. 11.



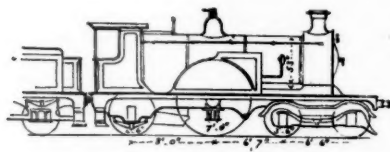
No. 12.



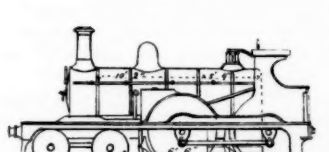
No. 13.



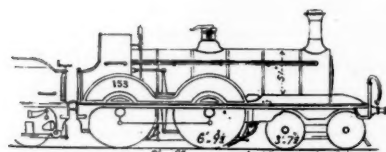
No. 14.



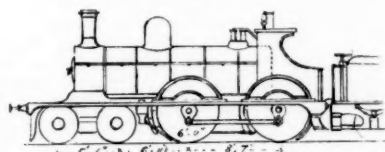
No. 15.



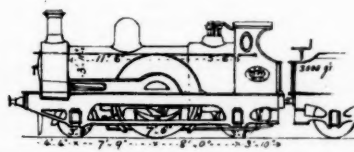
No. 16.



No. 17.



No. 18.



No. 19.

OUTLINES AND GENERAL DIMENSION OF SOME OF THE STANDARD EXPRESS LOCOMOTIVES NOW IN USE IN GREAT BRITAIN.

The numbers refer to the description given in the table herewith.

Tests made on bars strained hot and subsequently ruptured cold indicate that this treatment causes a change in the tensile strength and elongation. There appeared to be a temperature between 335 degrees Fahr. and 740 degrees Fahr. in which hot straining raised the elastic limit and tensile strength above the normal. Above this temperature there appears to be a loss in tensile strength and elastic limit.

Interesting data are established regarding the color of steel after cooling, thus:

Heated, below 200° and cooled.	Color unchanged.
300° to 400°	light straw.
400° to 500°	deep
500° to 600°	purple bronze, blue.
600° to 700°	light blue, blue black.
700° to 800°	dark blue and a soluble coating formed.
800° to 1,000°	An insoluble glaze formed.
1,000° to 12,000°	
15,000° and cooled	becomes coated with red oxide.

Tests on riveted joints of boiler plate up to 700 degrees Fahr. gave results in accordance with those of plain bars. At 200 degrees, a decrease in strength was apparent. At 250 degrees and above, the strength exceeded that at 70 degrees. Wrought iron rivets showed a maximum shearing strength at 30 degrees Fahr., an increase of seven per cent. over strength cold.

The conclusions reached from a study of Mr. Howard's paper are briefly as follows:

1. The coefficient of expansion of iron and steel depends upon the amount of pure iron present, and diminishes as the carbon increases.
2. The elasticity of iron and steel diminishes with rise in temperature.
3. The tensile strength and elongation of iron and steel diminish as temperature rises to a minimum at 200 degrees approximately, and reach a maximum at about 500 degrees Fahr.
4. Riveted joints observe approximately the same changes as plain bars, with increase in temperature.
5. The color of a bar of steel after cooling may approximately indicate the temperature to which it had been heated.

Hungarian Railroads.

In 1867 there were 1,418 miles of railroad in Hungary, of which 78 only belonged to the state. Hungary is a great grain exporting country, and this small mileage left the greater part of it with very imperfect outlets to markets. The government, therefore, undertook the creation of a considerable railroad system, attracting capital by guaranteeing interest to the companies constructing the lines. This plan had its usual consequences: the expenditures were excessive, in some cases enormously so; but a large addition was made to the railroad system, which in 1873 reached 3,863 miles, on which the government guaranteed the payment of about \$7,500,000 yearly interest. The panic of 1873 put an end to the prosecution of these enterprises, leaving most of the new lines in no condition to do good service or earn interest. In 1874 the net earnings of the 14 principal roads were less than 1 per cent. on their capital. The Eastern Railroad soon fell into such difficulties that the state was compelled to come to its aid, and in 1876 it bought it, though itself in bad financial condition, and in 1880 it acquired the Theiss Railroad, and thus was laid the foundation of the present state railroad system. Several of the other lines, though extraordinary assistance had been afforded by the government, were in a very unsatisfactory condition, and in 1884 the government began systematically to acquire the guaranteed lines and to form a great state railroad system. There remain now but four of the guaranteed lines, and these are largely subject to regulation by the state. Within twenty years it has had to expend some \$95,000,000 for these lines, chiefly for interest which they did not earn.

Meanwhile very few new private railroads were constructed, except a system of local roads, somewhat like what are called "tramways" in Italy (which are not tramways at all, but light railroads). Special privileges and exemptions are given these local railroad companies, and they are less subject to government regulation than the other lines. Many of them are worked by the administration of the state railroads with which they connect, the owners receiving the net earnings.

At the end of 1887 the total Hungarian railroad system had grown to 6,293 miles, 1,013 of which were local roads. Of the main lines, 2,746 miles belonged to the state and 925 were guaranteed by it, leaving 1,609 miles in the hands of private companies.

The state system in 1887 earned 3.93 per cent. on its cost. This may seem an unsatisfactory result; but it must be remembered that the state system is very largely formed out of the guaranteed system, which cost the state yearly large sums for interest.

The government policy has aimed especially at the stimulation of exports, which consist chiefly of timber, cattle, grains, and other products of the soil. Like the United States, Hungary must compete for this trade with the rest of the world, and it has competitors on all sides. Moreover, the government has aimed especially to create an export trade by way of its sole port, Fiume, on the Adriatic, which is only about 50 miles from the Austrian port of Trieste; the latter is in a position to serve as an outlet to Hungary, and is a much more important port; but the Hungarians are anxious to have a port of their own, and, by their possession of a line to Fiume and the power to make rates to that port

more favorable than to Trieste, they have the ability to turn an important traffic in that direction. The other chief outlets for Hungarian rail exports are via Vienna, and the Danube at Semlin, opposite Belgrade; and the government has aimed especially to make low rates to Fiume, Vienna and Semlin. The reductions made since the acquisition of the line by the state in the rates from Buda Pesth to Fiume, on such articles as grain, timber, wine, spirits and petroleum have been from 27½ to 45½ per cent.

The workings of the Hungarian zone tariff for the first four months are reported in round numbers as follows:

No. of tickets sold:	1889.	1888.	Inc.	P. c.
August.....	1,117,000	434,000	678,000	156
September.....	1,145,000	427,000	718,000	168
October.....	1,300,000	413,000	887,000	215
November.....	974,000	342,000	632,000	184
Four months.....	4,294,000	1,616,000	2,678,000	166
Earnings, 4 mos. (florins).....	3,744,478	3,188,641	595,837	18.7

Meanwhile the number of pieces of baggage handled was reduced from 240,000 to 180,000, owing doubtless to the fact that a charge is made now for all baggage that goes into the baggage-car, while previously 55 lbs. were carried free. The earnings from baggage increased 85,145 florins. From the above it appears that in 1889 only one passenger out of 24 took a trunk with him, and even in 1888, when he could have one carried free, only one out of seven was so encumbered. Those who have seen the vast quantities of valises, bundles, satchels and baskets which Europeans take into the cars with them will wonder less at this than those familiar only with American cars, where there is no place to stow away so much lumber; but the small amount of baggage in the Hungarian baggage cars is remarkable even in Europe, and is an indication that nearly all the Hungarian travel is strictly local, and that very few of the passengers spend more than a few days away from home.

The increase in the number of passengers, it will be seen, has been well maintained from month to month, and has really been enormous. That the result has been financially favorable seems doubtful. So far the increased traffic has been handled with scarcely any addition to the rolling stock, but it is reported that the cars are often uncomfortably crowded. How much increase of train mileage there has been we are not informed, but the increase in earnings has been only about nine cents for every additional passenger journey, and unless the train loads have been extraordinary and the average journey very short, it is not easy to see how this can pay the additional expense. If, however, there is some reduction in the profits, the result, doubtless, will be considered very satisfactory both by the state railroad administration, which made the experiment, and the public, which enjoys the low rates of the zone tariff. It may have important effects in other countries than Hungary. Indeed, in Austria already it has been decided to make an important reduction of rates and a partial application of the zone system on the first of June next, and the subject is attracting much attention in Prussia, where the state railroad authorities declare themselves inclined to make considerable changes in the present system of passenger rates, though they are not yet ready to say what these changes will be, and, so far as their declarations go, do not seem inclined to the zone system.

Terminal Station, Mexican National Railroad.

(WITH AN INSET SUPPLEMENT.)

The following description of the proposed terminal station in the City of Mexico for the Mexican National Railroad-Co., the perspective and plans of which we show on an inset, will doubtless be of special interest to many of our readers.

The total length of the building and train shed, as shown on the sketch is 258 ft., the total width 67 ft., making one of the largest railroad stations in Mexico. The general construction above the ground is of tepetate. The openings for doors and windows are trimmed with red brick. The main archways of the tower, with the capitals and string courses around the building, are of local sandstone. The general style of architecture has a strong Spanish feeling, but the general construction and requirements are in keeping with the latest advancement in railroad architecture, ideas and methods. The tepetate being partly soft, the weight has been divided on initial points, as shown on the plans, thus forming a safe and economical method of construction.

Very little woodwork, excepting the floors and doors and necessary sash frames, is provided; the arries and jambs of the openings on the inside being rounded, and all finished, the same as the side walls and ceilings, with cement plastering. It is intended to have all the woodwork exposed to view, principally of southern pine, shellaced and finished in hard oil.

The dials and hands of the tower clocks are of wrought iron, projecting about 12 in. beyond the face line of the building. The grilles at the openings, and the hardware and gas fixtures, where exposed to view, are all intended to be of wrought iron in dead black finish.

The general arrangement of the available space has been divided to the best advantage for both public and administration purposes. The general contour and ex-

terior effects are gained entirely by constructional outlines, and not fine detail or expensive work.

A peculiar feature of the general design is the admission to the trains through but one entrance, the waiting rooms opening from the platform side only. The requirements of the country make it necessary to have first, second and third class waiting rooms. The ticket office opens from the outside of the building. After purchasing tickets, the baggage rooms are entered from the outside, baggage checked and admission gained to the waiting rooms and trains. The mail and express service has been provided for generously as an important feature; a fire and burglar proof vault being provided for money and valuable parcels.

The Depot Master is also accommodated on the first floor. The second story contains the offices of the Train Dispatcher, Superintendent, Road Master and a large conductor's room, besides storage for station and supplies.

The plans have been prepared by Mr. Bradford L. Gilbert, Architect, of New York City, who has made a specialty of railroad structures for the past 15 years and erected some of the largest buildings of this class in the country.

The New York & Long Island Tunnel.

The contemplated tunnel under the East River that is to connect the Long Island Railroad with the New York Central & Hudson River Railroad is an important and interesting project, some features of which we are enabled to present to our readers through the courtesy of the Chief Engineer, Mr. O. W. Barnes.

The tunnel is to start at a point on the Long Island shore beyond the Dutch Kills, pass under that inlet, and beneath Hayward and Oliver streets, Van Alst, East and Vernon avenues and West street, reaching the river at a point under the foot of Seventh street, five blocks above the present ferry slips of the Long Island Railroad. Before reaching this point it has come into and is running in direct alignment with the centre of Forty-second street in New York. It passes under the river on a descending gradient of 1.25 per cent., or 66 ft. per mile, until it reaches a point 1,050 ft. from the New York shore. Here there is a level of 1,200 ft., with the bottom of the tunnel 120 ft. below mean high water mark, followed by a rising gradient of 1.2 per cent., or 63.36 ft. per mile. This brings the excavation to the surface at a point between Tenth and Eleventh avenues.

It is not the intention to disturb the streets of either city in any way by the construction. In Long Island City the portal and open works will be on private property acquired by the company or on the right of way of the Long Island Railroad. In New York the tunnel runs under Forty-second street to a point under Tenth avenue, where by curving northwardly the line deflects from the street in order to locate the portal on private property north of Forty-second street through which it passes by an open cut to Eleventh avenue, making connections on the surface with the tracks of the New York Central a short distance north of Forty-third street, as shown in fig. 2. A branch line from the main tunnel will deflect from the tangent of Forty-second street at a point 400 ft. west of the curb line of Tenth avenue. Curving from there to the left it will pass on to the private property south of Forty-second street, and will emerge from a portal and pass through the block in an open cut to and under Eleventh avenue by an iron girder bridge, the ascending grade bringing the tunnel roadway to the surface in the present abattoir property in the block between Fortieth and Forty-first streets. Here the tracks will be extended to the North River where there will be slips for receiving from transfer barges railroad cars from the railroads terminating on the west side of the Hudson River.

It will be noticed by reference to the profile, fig. 1, that there is a reef in the East River 1,120 ft. east of the New York shore. This is Man-of-war rock, located 1,300 ft. south of Blackwell's Island, and is bare at low water. A coffer dam will be built on and about this rock and a shaft sunk to the bottom of the tunnel from which headings will be driven in each direction. As it is the intention to put in passenger elevators at the Grand Central Depot, shafts for these will be sunk at first and headings driven in both directions from this point also. Work will also be prosecuted from each end. It will be seen that there is every facility for rapid progress and the easy disposal of the debris. At the east end it will be hauled away by the Long Island Railroad at the west end and the Grand Central Depot by cars on the New York Central, and at Man-of-war rock by scows. Thus eight headings can be driven at one time; counting 50 ft. progress per week for each heading will give 400 ft. of excavated tunnel per week.

At Man-of-war rock permanent pumping and ventilating works will be located for the drainage and ventilation of the tunnel. Under this point a sufficient sump well will be dug, into which all water from either end will flow, whence it will be lifted to the surface and poured into the river.

In driving the tunnel below the river the first heading will follow the grade line of the roadway so that there will be a thickness of 50 feet of rock to resist the blasting needed in excavating the heading.

The roof of the completed tunnel will be 25 ft. below

the river bottom. This thickness is deemed safe in view of the fact that in excavating under the river bottom at Hell Gate, Gen. Newton's miners worked in some small areas within 8 ft. of the river bottom. No trouble is anticipated from cracks or fissures in this rock, as it is gneiss and very solid, so that it is not at all likely to be disturbed by the light blasts that will be put in to drop the roof work into the first heading. This naturally demonstrates, moreover, that the property owners along Forty-second street will never suspect that a tunnel is being run under their street.

In Long Island City the bed rock is farther from the surface, and the work will have to be prosecuted for a distance through gravel. In passing under the Dutch Kills a coffer dam will be built, the tunnel carried through in the open and arched over, filled in and the waters allowed to ebb and flow as before.

It is the present intention to put in two elevators at the Grand Central Depot and one at the corner of Sixth ave., though the latter has not been decided upon. The Grand Central elevators will have a capacity for 50 passengers each and come to the surface in the southeast corner of the present arrival station. The ventilating and other elevator shafts will be located as convenience and economy may dictate.

The arrangement of an underground station is indicated in fig. 3. There will be a broad platform on either side close to the rails, opening back through gothic arches cut in the living rock into corridors 11 ft. 8 in. wide in the rear. These corridors and platforms are laid out 420 ft. long, but it is evident that they can be cut to any length that the necessities of the traffic may demand.

The tunnel itself is to be 26 ft. wide and 22 ft. 6 in. high, which will give ample head room for a man to stand with safety on the roof of the ordinary freight car.

The sectional engraving of the tunnel and elevator, fig. 3, shows the arrangements at the Grand Central Depot so clearly that no comment is necessary.

Electricity will be used in lighting the tunnel and the walls of the corridors, and pillars at the stations will be lined with white glazed brick to brighten the effect. It has also been proposed to use electric motors for hauling trains, but no decision has yet been made upon the matter.

The thickness of the rock over the roof of the tunnel below the street surfaces is as follows:

First avenue.....	114 ft.
Second avenue.....	118 "
Third avenue.....	97 "
Lexington avenue.....	95 "
Fourth avenue.....	98 "
Madison avenue.....	103 "
Fifth avenue.....	106 "
Sixth avenue.....	83 "
Seventh avenue.....	66 "
Eighth avenue.....	46 "
Ninth avenue.....	20 "
Tenth avenue.....	2 "

The total length of tunnel is about 17,000 ft., and the cost is estimated at \$1,000,000 per mile.

The following is an estimate of quantities:

550,000 cu. yds. tunnel rock excavation.	
400,000 " earth excavation open cuts.	
40,000 " masonry in walls.	
75,000 " " arches.	
9,400 " shaft linings.	
230,000 enameled brick.	
1,500 cu. yds. enameled brick labor.	
1,100 " jack arches.	
535,000 lbs. iron girders.	
7,500 ft. piling.	
1,000,000 ft. B. M. timber.	
70,000 sq. ft. of street paving.	
10 elevators for 50 passengers each.	
Five iron stairways.	
Four station buildings.	
24,800 lin. ft. of 20 in. drain pipe.	
12 miles (90 lbs.) steel rails for track and sidings.	
Ventilating plant.	
Bridge over 11th avenue at 43d street.	
Buildings and pumping plant on Man-of-war rock.	
To all of which must be added the outside work of rebuilding sewers and changing the gas and water mains near the west end.	

American and Foreign Railroads.

The March number of the *Journal of the Association of Engineering Societies* contains a paper on the above subject by Mr. Willard Beahan, whose name is well known to many of our readers. Mr. Beahan crossed the Isthmus, went down the west coast of South America, crossed from Valparaiso to Buenos Ayres, and then took a run through France and England. We give a few extracts from his paper:

We pack our mules carefully at Los Andes, the end of the Chilean Railroad, and the foot of the Andes. We are bound for the Argentine Republic, and it is 225 miles by pack trail over the Andes to their nearest railroad terminal. We pass up along the Cordillera River, and the new grade of Clark's Trans-Andine Railroad is always in sight. Clark is an Englishman who has a concession from Chili and the Argentine to join their railroads. He has been at work two or three years. He uses a four per cent. grade and says his tunnel will be the longest in the world. That fact endears it to the Castilians. At 2 a. m. of the third day out you start through the snow to cross the summit. It is bright moonlight and the snow-covered, rugged Andes, towering away above you, still give shadow effects that bring words of admiration from even a prosaic railroad man. You are breathing hard as you reach the summit at Uspallata pass, 13,000 ft. above the sea. You see a triangulation station of the Trans-Andine Railroad line at the summit, leave the snow and Chili and

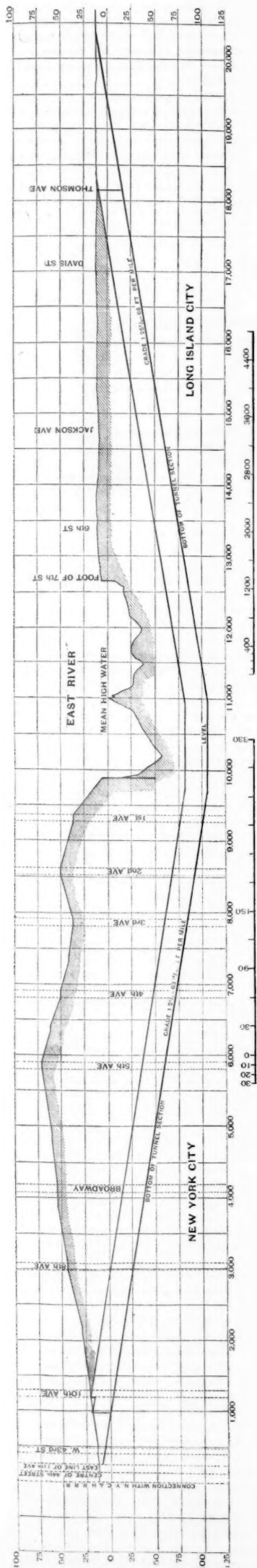


Fig. 1.—General Profile.

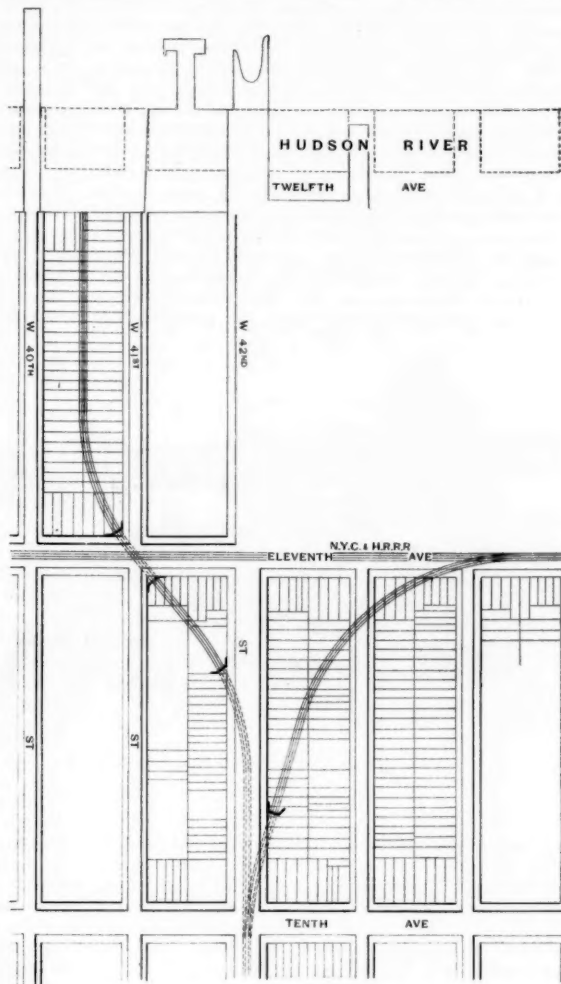


Fig. 2.—Connections with the New York Central & Hudson River R. R.

PROPOSED NEW YORK & LONG ISLAND RAILROAD—TUNNEL AND CONNECTIONS.

step at once on bare ground and the Argentine soil. You roast on the Pampas four days and ride into Mendoza and see the end of track of the Argentine railroads. Of this trip across the Andes much is said in those countries. Its hardships consist of some forty-mile stretches without water, of sleeping out of doors in the cold and of scanty food. You subsist mainly on dry bread and a species of dried beef called Charca. If you are inured to discomforts the scenery will repay you for the effort. The dangers consist in the liability of being caught near the summit in a sleet storm. Every little way you see a stake where lies a victim to bravery—the snow his winding-sheet. The streams are torrents and are deep and dangerous at times.

The Mendoza repair yard is an engine graveyard. There are "Rogers" and "Baldwins" there, built in 1886, which their makers would scarcely recognize. Corroded and scaled by the worst of alkali water, burnt out by coal, cordwood, Cardiff bricks and mesquite roots in mixed diet and covered with rust and dust, and leaking at every connection, and cobbled up in every possible way, they look pitiable. These freight engines will start out to-day. The run is about 500 miles for a round trip, and they will be looked for back one month from to-day. Our own engines are used in the Argentine Republic usually. Any one runs them; you have seen the men are not equal to the no easy task in the West. Our cars are, as a rule, used; rails are European, of course, laid to a gauge not less than our standard.

The ties here are iron. I understand that it is the principal railroad in the world using iron ties for a great distance and a term of years. They therefore deserve more than a passing notice. As we have been traveling some hours now by rail out of Mendoza, let us examine these ties at the freight wreck we are being transferred around. The ties are so completely buried by the earth when in the track that it takes a wreck to exhibit them. They support the rails at a metre's distance apart. A tie consists of a support under each rail, and these supports are tied together by a wrought iron rod, $\frac{1}{2}$ in. by $2\frac{1}{2}$ in., that is keyed to the supports. Each of the two supports consists of an iron casting $\frac{1}{2}$ in. thick and shaped like a meat platter; or, if an ellipsoid be cut by planes parallel to its major axis, so as to divide the minor axis into three equal parts, the two outer sections would make a pair of supports. Each is about 20 in. long and 9 in. wide, and is placed with the convex surface upward. Two projecting lips hold the rail on one side. A slot into which is driven a corrugated key of cast iron holds the other side of the rail. The castings are dated 1884, are made here and have been in the road since built. The ties are destroyed much less by this wreck than you would expect. Looking at them, I should judge a tie complete to weigh 150 lbs. It

is a mud road—no ballast. The track is in good condition. You have seen that the earth cannot work from under them. Why are these not good metal ties? We ride over them several hundred miles. At each shop they make the castings. You can see here and there another tie made of a thin plate of mild steel. Take a wooden log the length of our ties, remove the bark from

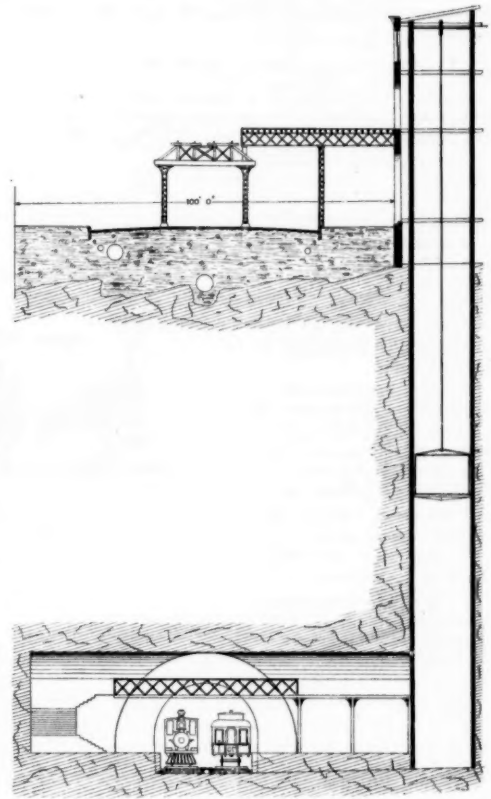


Fig. 3.—Sketch Showing Underground Station and Elevator.

the upper third as it lies on the ground, bend the ends down for one foot and flatten them out there, and you have this second kind of iron tie. Catches, only, hold the rail to it. The ties have to be slid from the rail ends before laying the rail—if I saw aright.

You are riding along through the Argentine in an antiquated Pullman, and it is some 600 miles from Mendoza to Buenos Ayres. The country is like Texas, Kansas or Nebraska. A plainsman from here feels at home there. You watch the railroad location work and do not detect apparent grievous faults. These roads resemble ours of western Texas. Reaching the eastern part of the country, you see a land most beautiful and fertile and prosperous. In 36 hours from Mendoza you are at Buenos Ayres, the capital and principal seaport. The Argentine Republic is the greatest republic in the world after our own, and in time is sure to become easily the controlling power in South America. We have seen a considerable portion of its railroad. The lines are none of them old; this is in their favor. Again, the country is easy for the locating engineer. On construction, wood is expensive; little is used in structures. Maintenance is a simple matter. Yankee engineers have been there from the first, and the rest have been English. These are the two best nationalities in railroad engineering. Aside from metal ties and a quite elaborate shop and terminal plan tendency, these resemble Yankee roads closely. There may in future come to us from that country some good lessons in railroad work.

You land at Boulogne, France, and rest your sea-sick stomach. Strolling through the yards of the Northern Railroad of France, you will first notice their freight cars. There are but two classes of freight cars in the world, I think; one class is Yankee—the other is not. This negative variety stands before you. It has high wheels—one pair forward, one in rear, and the axle boxes are rigid with the frame. The car floor is high above the track. The car is short, say 15 ft., and carries a little more than half as much as ours. They are coupled with a three-link and hook arrangement, like a coal or dump car. They are of wood with a roof of corrugated iron. A train carrying 1,000 tons of freight in these cars would be a longer train than ours, would weigh more empty than ours, and would pull harder per ton of gross train on curves, for it is on longer rigid wheel bases. The brakes are set with a lever 8 ft. long, lying alongside the car at the floor. It cannot be set while the train is running. They have a powerful brake in the caboose. Few brakes and link couplings with much slack make it a dangerous train to handle. This freight car standing before you is the only competitor of our eight,

wheel, two-bogie freight car, whose rigid wheel base is less than that of a common street car. The outcome of the competition, I think, requires no prophet to foresee.

Our own engines are greater for us, certainly. Our car and locomotive builders stand more clearly in the front rank as compared with Europeans than do we civil engineers as compared with our foreign competitors. Our cars will ere long be the only ones save in dense, small, old countries. Our locomotives have a harder competitive task, but, for all in all, they are unequaled.

Leed's Cylinder Boring and Facing Machine.

The cylinder boring and facing machine herewith illustrated has been in use for some time past at the Louisville shops of the Louisville & Nashville R. R. Co. Among other work has been the boring of 20-in. cylinders, 33½ in. long, counter-bore 2½ in. long, finishing them complete with flanges faced and turned in less than seven hours each. This is rapid work in the hard composition used for cylinders. Instead of a facing arm a side tool is used in the cutter head.

The bed, housings and platen are heavy. The boring bar is 8 in. in diameter and is driven by powerful gears 4½ in. and 5-in. face, backgears 36 to 1 and driven by a 5-in. belt on cones, the largest of which is 30 in. in diameter, and smallest 18 in. in diameter, with five changes. The feed is changeable by placing change gears similar to lathes for cutting screws. Distance between bearings for bar in the regular sized machine is 4 ft. 6 in., but can be made to meet any requirements.

The platen is 36 in. long, with suitable T-slots for securing the work. From top of platen to centre of bar is 17½ in. At the end of the machine, forming a part of the shaft support, is a sheave to take the weight of bar when drawn out to place cylinder on platen. The platen has adjustment and is operated by a screw 2½ in. in diameter by a crank from either front or rear end of the machine. When desired there are furnished four adjustable saddles to receive cylinders, which have movable parts, operated by screws and wrench to facilitate placing cylinders in position for boring. This machine is made by Messrs. Pedrick & Ayer, Philadelphia, Pa.

The Fowler Rolled Steel Wheel.

The form of the plate of the Fowler rolled cast steel car wheel has been changed to the form shown here, which gives an increased strength with less weight than with the old style of plain plate. This wheel in the old form has been in use on the Boston & Albany for two years without having been turned. The Fowler Car Wheel Co., is now prepared to furnish these wheels in any quantity. Sixteen wheels have recently been shipped to the Manhattan elevated road in New York City for trial. As the process by which these wheels are made is well known to our readers, it is only necessary to refer in a general way to the method of construction. A solid blank of steel is first cast by the Robert process at the Fowler Co.'s works near Chicago. This blank is then heated and rolled by a cluster of rolls which surround the wheel and which are slowly forced to the centre by heavy pressure. This reduces the diameter of the wheel to the standard size and condenses and solidifies the metal. The wheels are put into service without turning, but can be turned down as desired after use. The company receives the old wheels as scrap in exchange for new wheels. This wheel is made by the Fowler Steel Car Wheel Co., Adams Express Building, Chicago.

American Practice in Block Signaling.

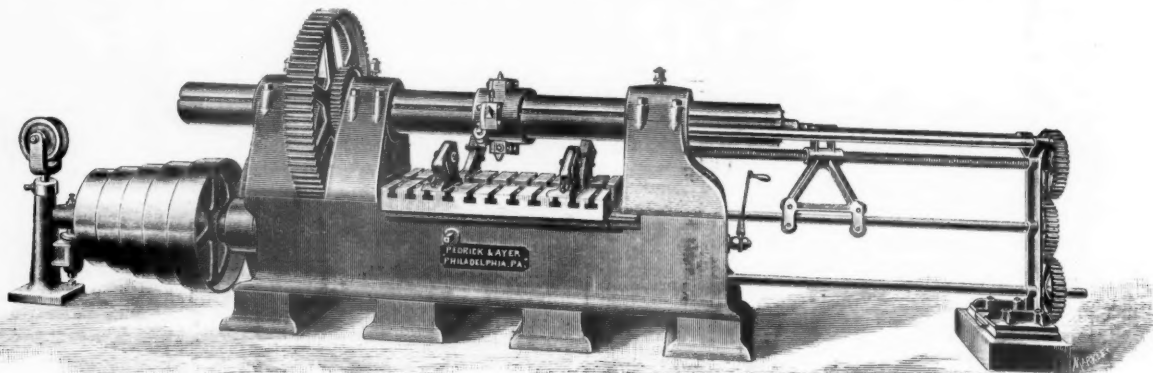
II.

THE SYKES SYSTEM.

The most common form of electric locking, as an additional safeguard to be used in connection with the block system as described in our previous paper is that known as the Sykes system. In fact, this is the only apparatus of the kind yet put in use in this country. It is in use on the New York, New Haven & Hartford, the New York, Lake Erie & Western and the New York Central & Hudson River. The latter company has only about 18 miles of road equipped with this apparatus (all in New York City), but as the system has here been in use longer than on either of the other roads named, and has to meet the most trying conditions, we shall base our description on the information given by officers of this road. The New York Central allows no permissive blocking whatever where the Sykes instruments are in use.

The apparatus consists essentially in a series of elec-

tro-magnets so connected with the levers by which the operator moves the outdoor signals that the operator at the outgoing end of a block section controls the lever by which the operator at the incoming end, admits the trains. Thus, after A sends a train to B and puts his signal at danger, he is unable to again pull the signal to "all-clear" until B unlocks his (A's) lever; and B, of course, refuses to do this until the train has arrived and passed out of the section. To provide against a possible mistake by B, who might prematurely unlock A's lever, there is also an automatic arrangement by which A's lever, after having been put through the motions to admit a train, cannot be unlocked until the train itself actually passes out of the section. This is secured by running the electric circuit, which controls A's lever, through two or three rail lengths of the track at a point just



LEED'S CYLINDER BORING AND FACING MACHINE.

Made by Messrs. PEDRICK & AYER, Philadelphia, Pa.

beyond B. The circuit goes from the battery to one rail of the insulated section of track, thence by line wire to A's signal, which it holds locked at danger by energizing an electro-magnet. On the passage of a pair of wheels over these insulated rails, the circuit is led through the wheels and axles from one rail to the other and thence back to the battery without going to the electro-magnet at the distant station, thus demagnetizing that instrument and allowing the signal to be again operated.

It will be seen that, where trains are run permissively, that is, where a second train passes A before the first one has passed B, the automatic feature of this system becomes useless, as the first train will release A's signal while the second train is still in the section, and the apparatus will then afford no protection against a careless operator admitting a third train to the section before the second has cleared it.

One section of seven miles of double track, on which there are seven stations, was equipped by the New York Central in 1882. The cost of this, including two interlocking machines for handling three switches and six switches, respectively, was \$8,300, of which \$2,050 was for the seven cabins and 25 semaphores. The cost of operating these seven stations is, per year:

Salaries of cabin men.....	\$9,480
Salary of electrician.....	1,000
Four men attending signal lights.....	1,920
Cost of repairs (estimated).....	1,000
	\$13,400

This estimate would be too high for a system comprising many stations, as the salary and wages account would be distributed over more stations. On another road the cost of maintaining 24 stations using Sykes locks was estimated at \$3,043 per year, divided as follows:

Battery supplies.....	\$153
Battery men and inspector of electrical apparatus.....	1,440
Ordinary inspector (occupied partly with other duties).....	300
Miscellaneous repairs, materials, paint, etc.....	150
Deterioration, estimated.....	1,000
	\$3,043

This, of course, does not include the wages of the operators, who, in this case have, at many of the stations, other duties to perform.

If we add the salaries of the operators to this estimate, the average cost per station per year will be, in round numbers:

Two operators (day and night), at \$55 each per month.....	\$1,320.00
Battery supplies.....	6.50
Inspectors.....	72.50
Miscellaneous repairs.....	6.50
Deterioration.....	41.50
	\$1,447.00

This takes no account of lamp lighters. Where there are no distant signals the operator can generally light the lamps himself. In both the cases cited there are but few distant signals. Where there are near regular stations the work of attending to the lamps can be economically devolved upon the man who attends to the ordinary switch lamps. The expense chargeable to block signaling for this service is to be added to the total above given (\$1,447), while on the other hand this sum can be diminished by an amount equal to such portion of the operators' salaries as can be fairly charged to ordinary station work.

The Sykes instruments, like most other electro-magnetic devices, require constant and careful inspection. One inspector has told us that, from a careful record, he found his instruments to fail once in 20 days. He did not give the number of trains, but as the causes of the failures

were mostly on account of inadequate inspection or too infrequent renewal of battery, he had no doubt that by the increase of his force of inspectors he could reduce these failures to practically nil. On another section, where he was able to provide sufficient men to look more carefully after the apparatus, a number of signals had been worked under a very heavy traffic for more than a year without a single failure.

SINGLE TRACK BLOCKING.

Within the past seven years a number of railroads have introduced the block system on single track lines, modifying the regulations somewhat to conform to the different conditions. This system, as used on the Canadian Pacific, was described in the *Railroad Gazette* of Dec. 2, 1887. Its operation on a division of the Chicago, Milwaukee & St. Paul was described June 22, 1888, and the same

system, with a novel arrangement of telegraph wires and sounders, as used on the Chicago & Council Bluffs division of that road, was described Jan. 17, 1890, page 35. An account of the system as employed on the Wabash was given Feb. 8, 1890. The salient features of these applications is the moderate cost, which has been reduced to a minimum. A single track road naturally has fewer trains than a double track line, and in nearly or quite every case the improved system has been put into effect wholly by the employment of regular station operators, no towers being established, and the only important additional expense being the employment of night operators at some stations where otherwise the office would be kept open only during the daytime. There is no practical difficulty in making this system as effective as the regular double track block, but most or all of the companies using it have put it in as a necessity and have not felt able to incur the expense of new signals, carefully located for purposes of block signaling, of distant signals and of protection for side tracks and other facing-point switches between stations. They have treated the block system essentially as an adjunct of the train dispatching system. While by no means perfect, there can be no question that the system is a valuable safeguard against rear collisions. Assuming that conductors and engineers are properly disciplined so as not to depend upon the system for protection against dangers which it does not pretend to cover, its value as a substitute for the uncertain flagging system, especially in cold and stormy weather, is undoubted.

The rules under which this system is operated vary considerably on the different roads named, as will be seen by reference to the accounts cited above. One of the most valuable rules in connection with this plan of working is that which requires inferior class trains to time themselves so as to be wholly out of a block section before the time at which a superior class train is due to enter it. Another is that which provides that when a train is to take a side track at a station the operator must not open the block for another train until this one has completely cleared the main track. All the roads named, we believe, employ the ordinary train-order signal for stopping and starting trains, though the Chicago, Milwaukee & St. Paul has a semaphore for block signaling and one of the old style disc signals for train orders. The use of two danger signals at the same station would seem to be of questionable expediency, as locomotive runners would probably be as likely to overlook one of the signals as an operator would be to make a mistake in using one signal for two purposes. A number of roads which use the block system on single track allow train dispatchers discretion in suspending rules during clear weather, and on portions of the road free from curves, when traffic can be hastened thereby; and these rules are used temporarily during fog or severe snow storms on a good many miles where the companies have not yet seen their way clear to incur the necessary expense of their constant operation. On the Canadian division of the Michigan Central passenger trains are kept one or more stations apart by the regular train-order system, the dispatcher giving a special written order to the operator in regular form for each operation; and this system is extended to freight and other trains during fogs and snow storms.

Cost of Operation.—As intimated above, there is generally no special item of expense connected with this system, except the employment of additional

operators. The Wabash employed three at \$45 each per month on a section of 20 miles. The Chicago, Milwaukee & St. Paul added six on a section of 130 miles. On this 130 miles the cost of new semaphores and a line wire with electro-magnets (sounders) of a special form was \$30 per office, these averaging four miles apart.

A recent letter from a Wabash officer gives details of operation of the system on a 20-mile section of that road which were not fully explained in the article above referred to. We quote a paragraph:

"When a train passes a station, the operator reports the time and adds, 'signal out.' This report is watched for by the operator at the station the train previously passed, and he then responds 'signal in,' releasing the block. The dispatchers overhear these reports, and know always that the proper responses are being made, but the operators are so trained that it is not necessary to call them to release the block after the train has passed the next station. There has not been a single occasion when it was found necessary to suspend the operation of this system in order to avoid delays. It is true that some delays to trains occurred by reason of the use of the system, but we have had no accidents, although it is a very busy piece of the road; as high as 60 trains a day being moved over the 20 miles of single track between Decatur and Bement. I know of no instance where an operator has made a mistake, or permitted a train to go into a section when it was dangerous to do so."

This correspondent refers to delays. These cannot be accurately compared, as between a time-interval and a distance-interval system of spacing trains; but, as every one knows, the efficiency of a block system as a means of running trains close together depends wholly upon the length of the block sections. On the Wabash they are about four miles long. With stations one-fourth of a mile apart, 16 times as many trains could be run, and with perfect safety, at any speed, provided cautionary signals were erected at a sufficient distance from each block signal to allow the trains room in which to "pull up."

Although the Canadian Pacific was the first road whose single track block system was brought prominently before the railroad public, the eastern division of the Lake Shore & Michigan Southern seems to have been the pioneer in this respect, and we therefore add here an extract from a letter from one of the officers of that road:

"We have used for the last fifteen years positive block on passenger trains following each other, only allowing one train between the same stations at the same time. We only use positive block on freight trains during foggy and stormy weather. The positive block on passenger trains is solely in the hands of the telegraph operators, but, at the same time, the train dispatchers oversee the work, and see that it is done properly. The positive block on freight trains is in the hands of the train dispatcher, to whom the state of the weather is given every hour, and on whose judgment the necessity for the use of positive block depends. If a fog or snow-storm should suddenly come up, the operators immediately notify the train dispatcher, whether it is the regular time to report or not. If the train dispatcher directs the use of positive block for freight trains, then it is wholly in the hands of the telegraph operators, under the same conditions as the passenger trains. The same rules also apply to trains on double track."

TECHNICAL.

Manufacturing and Business.

A company is being organized in Pittsburgh, Pa., with a capital stock of \$100,000, by Mr. W. T. Paul, Manager of the Damascus Bronze Co., and others, for the manufacture of the Smith roller for car journal boxes, invented by W. O. Smith, of the Lake Shore & Michigan Southern road.

The Link Belt Machinery Co., of Chicago, Ill., will at once build a new machine shop 121 ft. wide by 408 ft. long, with traveling cranes, derricks, etc. It will be one of the best equipped and most complete machine shops in the Northwest. The building is to be of brick and iron, designed and built by the Berlin Iron Bridge Co., of East Berlin, Conn. The central portion of the building will be 42 ft. wide, with a 10-ton traveling crane running the entire length. The wings will be 40 ft. wide on each side and two stories high. The sidewalls are of brick and the interior portion is entirely of iron.

The Buffalo Steam Forge, of Buffalo, N. Y., has leased the Cayuta Forge & Axle Co.'s works at Sayre, Pa. This action was necessary on account of the recent large orders for car and locomotive axles.

Articles of incorporation have been filed in New Jersey by the Coale Muffler & Safety Valve Co., to manufacture machinery used in the construction of locomotives and stationary and marine engines. The capital stock is \$300,000. The incorporators are Joseph M. Coale, W. J. O'Brien, Charles J. Cary and Frank M. Coale, of Baltimore, and Samuel C. Childs, of Camden, N. J.

The Pittsburgh Reduction Co.'s plant has been undergoing alterations which will be completed in about ten days. The capacity will then be about 2,500 lbs. of aluminum per week.

The New York Equipment Co., of New York City, has removed its offices from No. 10 Wall street to more commodious quarters in the Wilkes Building, No. 15 Wall Street.

The large vulcanized rubber main driving belt, made by the New York Belt & Packing Co. for the New York Central & Hudson River road, to be used in its new grain elevator "A" in New York City, is exhibited at the company's warehouses, 15 Park Row. It weighs 4,800 lbs., and is 350 ft. long, 52 in. wide and eight-ply thick.

The Springfield Emery Wheel Mfg. Co., formerly of Springfield, Mass., has completed its new buildings at Bridgeport, Conn., and has removed its plant to that city, where it is now installed in new factories, designed especially for its business, on Howard Avenue and Spruce Streets. New and improved machinery has been added. The buildings are erected on land 1½ acres in extent. The company now manufactures the Stratton & McCulloch car box grinder; also a new car wheel grinder.

The works of the Simonds Rolling Machine Co., at Fitchburg, Mass., are to be enlarged, and new machin-

ery is to be put in. Twelve new large rolling machines are in course of construction, including one for making steel projectiles for the government, 40,000 of these having been so far ordered. Other special machinery is being built for the firm by the Pratt & Whitney Co.

The Ranken & Fritsch Foundry & Machine Co. of St. Louis, has completed a new erecting shop. It is now putting up a new 20-ton traveling crane in this shop, and other new machinery, including a radial drill, a 63 in. sq. and 24-ft. long four tool planer, a 54-in. swing, 38 ft. long lathe and new steam cranes.

The Union Feed Water Heater & Purifier Mfg. Co., of Chicago, has been organized by Charles N. Hunt, C. M. Wilkinson, G. B. Field and others.

Chadburne, Hazelton & Co., of Philadelphia, formerly District Agents of the Sprague Co., of New York, are now sole selling agents of the Westmore Consolidated Dynamo & Motor Co., of Baltimore, for the United States. The Equitable Electric Railway Construction Co., A. H. Chadburne, President, and W. A. Stadelman, Chief Engineer, will continue to do a general electric construction business for railroads and isolated plants.

Mr. George L. Fowler has opened a mechanical engineering office at 171 Broadway. He will give especial attention to estimates, designs and tests of machine tools, steam engines and other classes of power machinery.

Iron and Steel.

The Standard Steel Casting Co. is making large additions to its plant at Thurlow, Pa. The new buildings will consist of one 280 x 160 ft., which will be used for molding and drying castings, a new storage house 100 x 80 ft., and a gray iron foundry 100 x 60 ft.

Swindell & Smythe, of Pittsburgh, have contracts from the Phoenix Iron Works, at Phoenixville, Pa., for two 30-ton furnaces; from the Pennsylvania Tube Works for 16 producers for supplying the mills with artificial fuel gas; from the Oil City Tube Co., at Oil City, and the Tyler Tube & Pipe Co., at Washington, Pa., for regenerative furnaces for natural gas; also regenerative furnaces for the Paige Tube Works, at Warren, O., and furnaces for annealing heavy plates for Macneale & Urban, of Cincinnati.

The Lewis Foundry & Machine Co., Limited, of Pittsburgh, is constructing a 60-ton hydraulic crane for the new open-hearth department of the Pennsylvania Steel Co., at Steelton, and a five-ton Aiken hydraulic crane for the Columbia Iron & Steel Co., of Uniontown, Pa.

The Pennsylvania Iron Works, Philadelphia, is erecting a large foundry building in connection with its present plant. The new foundry will be 200 x 100 ft., and will have a 50-ton crane, which will connect with the plant already built, so that it will have a continuous travel of some 500 ft.

Eighteen furnaces for the melting plant of the Carpenter Steel Works, Reading, Pa., have been completed, and a 2,500-lb. and a 20,000-lb. steam hammer are to be erected in order to do the forging required by the government contracts.

The Rail Market.

Steel Rails.—The Chicago mills have orders which will keep them busy well into the summer. Pittsburgh mills have made sales of about 10,000 tons during the past week. Other large Western orders are expected to be placed soon. The order for about 30,000 tons for the Canadian roads has been placed in England. Quotations are: At New York, \$32, \$32.50 and \$33; at Pittsburgh, \$32@33 for small orders, and at Chicago \$35.

Old Rails.—Quotations are: At New York, a lot of 10,000 tons of old iron rails is said to have been sold at \$24. For old steel rails the quotations are variously given as \$19@20 and \$21.50.

Opening of the Merchants' Bridge.

The new Merchants' Bridge at St. Louis was formally opened on Saturday last, with imposing ceremonies. Special trains were run, carrying the Governors of Missouri and Illinois, accompanied by their staffs, and the two governors met and clasped hands on the centre span. Miss Josephine Cobb, daughter of Seth W. Cobb, President of the Bridge Company, hoisted the Stars and Stripes, and baptized the new structure by breaking a bottle of wine on the rails. The special trains then crossed to the Missouri side, where addresses were made by Governors Francis and Fifer, congratulating their respective states upon this new link which bound them more closely together commercially and socially. At night Governor Francis, of Missouri, presided at a banquet. Toasts were responded to by distinguished citizens, among them one on "Highways," by Hon. John W. Noble, Secretary of the Interior.

The Grand Central Station.

It is stated that the plans for the alterations of the Grand Central Station, New York City, which have been under consideration for several months, will soon be finally settled and the proposed changes be carried out. The station, which now consists of a train shed with a headhouse for the New York, New Haven & Hartford and the Harlem Division of the New York Central, with a side station for the Hudson River Division of the latter road, will be changed to a single large headhouse station to be used as an outboard station for all the roads together. The space occupied by the various rooms of the New Haven road will be enlarged by taking in a portion of the space between the rooms and the tracks to make one large waiting-room about 75 x 200 ft. The tracks will be shortened about 40 ft. to enable this to be done and still leave a sufficient platform space. The space now occupied by the waiting-rooms on the side will be used for baggage rooms, telegraph office, station-master's office, etc. Inward trains are accommodated in the annex, on the east side, built in 1885.

New Machine Shops.

V. G. Bogue, Chief Engineer of the Union Pacific, has asked bids for building a new extension of the Union Pacific shops at Cheyenne, Wyo. These include a ten-story round house, oil house 20 x 28, store house 48 x 178 ft.; office building, two stories, 40 x 40; paint shop, two stories, 95 x 275; wood working shop, 80 x 200; boiler and engine room, smoke stack and a transfer table, 200 x 30. This work is to be completed this year. Over 200 men are now being employed in the shops.

The East Tennessee, Virginia and Georgia has let the contract for the buildings for the Chattanooga shops to J. A. Galyon & Son. This includes a machine shop 342 x 100 ft. woodworking, paint and blacksmith shops each 321 x 90 ft.

The Rainbow Packing.

This article, as made by the Peerless Rubber Co., of 34 Murray street, New York, is the result of four years

experimenting, and it is claimed that results have been obtained which were heretofore considered unattainable with a rubber packing, namely: that the composition will retain its strength and elasticity when subjected to the action of oils and high steam pressure. It is further claimed that it will effectually resist the action of ammonia and the alkalis. It is also extensively applied to the manufacture of steam and hot water hose, being especially adapted to the connections of car-heating devices. It is said that there is never any tendency to disintegrate, and that if the face of the packing is coated with plumbago before applying, so that it will not adhere to the metal, the joint can be broken an indefinite number of times without injury to the packing.

Fairlie Engines for Mexico.

Messrs. Neilson & Co., of Glasgow, have recently completed some Fairlie engines for the Mexican Railway line, according to the designs of Sir Alex. M. Rendel. The engines are carried on double bogies, having each six coupled wheels 3 ft. 6 in. in diameter, and a wheel base of 8 ft. 3 in., the total wheel base being 32 ft. 5 in. Each bogie is fitted with two cylinders 16 in. diameter, with a stroke of 22 in. The boiler is of the regular Fairlie type, with two central fire-boxes, and it has a heating surface in the tubes of 1,532 sq. ft., and in the fire-boxes 180 sq. ft., making a total of 1,712 sq. ft. The grate area is 33 sq. ft. The boilers work to a pressure of 165 lbs. to the sq. in. The tanks—which are at the sides, and the fuel crates on the top of the boiler—contain 2,850 gallons and 300 cubic feet respectively, and when they are full, and the engine is in working order, it weighs upward of 92 tons. With the boilers working under full pressure the engine is capable of drawing on a level the enormous weight of 3,600 tons, or a train of 240 English carriages of 15 tons each. The section of the road on which these engines have to work has, for 14 miles, constant grades of 1 in 25, in combination with curves of 330 ft. radius—curves which the engines under notice freely traverse—and it has been found from a lengthened experience that the "Fairlie" is the only class of engine made which is capable of doing really satisfactory work on this line.—*Mexican Financier.*

THE SCRAP HEAP.

Notes.

The New York Central has placed fusee signals on all its passenger trains and issued rules for their use.

The San Antonio & Aransas Pass road has sold its telegraph lines to the Western Union Company for about \$100,000.

The wooden bridge of the Harlem River division of the New York Central & Hudson River, at Bronxville, N. Y., was burned on May 1.

The fiftieth anniversary of the establishment of the Adams Express Co. was celebrated May 5, in Boston and Baltimore, there being a dinner of officers and others at Boston and a parade at Baltimore.

A freight conductor on the St. Louis, Iron Mountain & Southern, near St. Louis, was shot by a tramp on May 3, and on the next night the new conductor in his place was fatally shot in attempting to drive a vagrant out of a box-car.

The Rice & Harrison theatre company, whose members were the principal passengers on the passenger train derailed at Staunton, Va., last week, have been paid by the railroad company a sum equal to three weeks' salary for each member, in addition to the amounts paid individually for personal injuries. The company had engagements for six weeks, all of which had to be broken.

Commencing on Monday next the Old Colony, New York, Providence & Boston and New York, New Haven & Hartford (Shore Line) will run a through day passenger train between Boston and Philadelphia, by way of the Harlem River transfer steamer Maryland (through New York Harbor), and the Pennsylvania Railroad. The west bound train leaves Boston at 8 a. m. and arrives at Philadelphia at 6 p. m. The night trains between Boston and Philadelphia, which were discontinued when the old Maryland was burned, are to be resumed on the same date. These run via the New York & New England instead of the Shore Line.

The agitation among the yardmen at Pittsburgh seems to have subsided, no definite reports from that city having been published during the past week. On May 1, a number of brakemen at Altoona asked the Pennsylvania for an increase of pay from \$1.65 to \$2.16 per day. The dispatch conveying this information stated that the working hours in the Altoona shops were reduced on May 1 from 10 hours per day to 9. The negotiations between the Union Pacific officers and the conductors of that road seem to be still unsettled. The conductors on the Eastern divisions claim that those on the Mountain and Pacific divisions, whose demands have been granted, will not accept the new settlement until the Eastern men gain their point.

A Bridge Unsettled by Earthquake.

The earthquake in California, April 24, moved the Southern Pacific bridge over the Pajaro River at Gilroy, on the Monterey line, throwing it several inches out of line and making it impassable. The piers, which are 60 ft. high, swayed and settled a few inches, and the rails pulled a foot apart. The ground settled from 6 to 12 ins. in some places.

An Impostor.

Mr. F. A. Lister, Superintendent of Transportation of the San Antonio & Aransas Pass, writes us that letters of recommendation bearing his forged signature have been presented to certain railroad officers by one B. E. Boyle, who is seeking employment, probably as agent and operator. Boyle also has in his possession an office stamp similar to Mr. Lister's.

Premiums for Continuous Service.

Vice-President Sterling, of the Illinois Steel Co., has submitted to the employees at Joliet a proposition for "profit sharing," which takes the form of a premium rather than of a dividend. In announcing it Mr. Sterling said that, after considering the many plans of profit-sharing, they had concluded to improve on all other systems, which so far were not unqualified successes, by paying a quarterly premium for faithful, competent, zealous and continuous service. Employees would, on application, receive 1 per cent. for the first year, 1½ per cent. for the first year and a half, and so on up, ½ per cent. increase for every six months, till it reached five years and 5 per cent., when it would remain permanent. This percentage is on the amount of wages received, the object being to get better work, more of it and less waste by trained employees in continuous service.



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Within less than a month three serious accidents have occurred from failure of the air brakes to control passenger trains. April 17, on the Southern Pacific, a heavy passenger train got away going down a grade of 116 ft. per mile. The train broke in two on a curve and the rear cars were derailed. April 28 a passenger train on the Chesapeake and Ohio got beyond control on a 70 ft. grade and the rear car was derailed, making a bad wreck, killing one and injuring eight. May 7 a Central of New Jersey train ran into a Lehigh valley train in Allentown, Pa., killing two and injuring six. It is said "the air brakes failed to work" and the train overran the station. Concerning the last of the three accidents, we have no particulars that are reliable. The first, that on the Southern Pacific, is supposed to have been caused by the fault of the engine runner. When a helper was taken on, the runner of the train engine put his valve on lap and shut the cock in the brake valve exhaust from the train pipe. Investigation makes it very probable that when the helper was cut off he did not open this cock. He was a freight runner, and had been in the habit of running an engine with an old style brass brake valve. It is said that he lost his head when he found that the brakes did not respond to the reductions of pressure. It is said further that the brakes were not tested after the helper was cut off. The engineer had been through two instruction cars and claimed to be familiar with the working of the engineer's valve. The most obvious lesson from this accident is (aside from all questions of discipline) that the best practice is to put in a cock in the train pipe below the engineer's valve and leave out the cock in the exhaust. This had already been done on many of the engines of the Southern Pacific, but not on the one in this accident. The only information that we have been able to get regarding the cause of the Chesapeake & Ohio accident is that the clevis on a brake beam of the tender broke, the beam fell, some of the brake rigging of the baggage car was torn off, and some part of the broken brake gear hit and closed the cock in the train pipe at the rear end of the baggage car. This explanation is given by an officer of the road who looked into the matter and who certainly is qualified to give an authoritative opinion. Of course accidents of this sort are not unknown, although they are rare. The natural means of preventing them is well known, and is now often applied. That is, to put the handle of the cock parallel with the train pipe when the cock is open. In

that position it could very rarely happen that anything would strike the handle in such a way as to close the cock. The trouble at Allentown is still unknown. We may conjecture that it was another of those cases to which we have so often called attention in the last two or three years, in which the proportion of the train load available for braking was too small, and in which the slack in the brake gear made it impossible to get the full braking effect. We might mention cases on first-class roads in which the slack on some of the passenger cars is enough to allow the pistons to travel the entire length of the cylinder and bottom on the cylinder head. Perhaps this was one of them. By way of contrast we might mention a road which regularly handles coal trains carrying 60,000 lbs. of coal in 25,000-lb. cars, on 200 ft. grades, with but about 24 per cent. of the weight braked. This is done successfully by keeping the brake gear in good order.

The Senate Bills on Safety Appliances.

Since writing last week on the subject of National legislation on safety appliances, we have received a copy of the Senate bill introduced, April 28, by Mr. Cullom. This bill provides that railroads engaged in interstate commerce shall use "automatic car couplers substantially uniform in pattern and of ascertained adaptability and convenience." The President shall appoint a board of five, "three of whom shall have practical knowledge of the operation of railroads, and two of whom shall have mechanical knowledge of car construction." This board shall examine and test, practically, couplers in use and designs for couplers, and shall determine the type of coupler "best adapted for safety and convenience" and shall report to the Interstate Commerce Commission designating the coupler selected, and the time when such coupler shall be put into use. If the coupler selected is patented the board may agree with the owner upon a price to be paid by the government for the relinquishment of the patent. Any railroad company that fails to put on couplers of the prescribed type within the prescribed time shall be liable to a fine of \$100 per day per car for every car not supplied with the coupler. The same board shall investigate the matter of brakes also, and make a report to be acted on by Congress.

Those who have examined the Henderson bill, of which a synopsis was given last week, will see fundamental differences between that and the Cullom bill. The Henderson bill simply prescribes the time when cars shall be equipped with automatic couplers, and leaves the railroads to select their own. Of course, this leaves great latitude, but it is an easy matter to prove that a coupler can or cannot be worked without going between the cars. The only excuse for the law is the danger of coupling with the non-automatic appliances. Further than to eliminate this danger, the government cannot go in this matter without unwarrantable and harmful interference. The Henderson bill would do away with going between the cars to couple or uncouple, and leave the railroads entirely free as to the means of accomplishing this end. The Cullom bill, on the other hand, would select for the railroads the apparatus to be used. In principle the bill is about as bad as it could be; and in practice it would delay the reform, if it was not found entirely inoperative.

It is a queer delusion that when a group of men is invested by a government with certain official functions, it also becomes endowed with wisdom to perform those functions. This Cullom bill is an example of the delusion. The railroad companies have through their mechanical officers, after years of experiment and careful investigation, and after the expenditure of a great deal of money, selected a type of automatic coupler. This coupler is being slowly perfected as its defects are revealed in service. It is already widely used, and its use is increasing fast. States have repeatedly tried to do by law what private enterprise is doing by natural processes, and have failed because their boards or commissioners have been unable to select couplers that stood the test of actual service. The search of the railroad companies for the correct fundamental principles on which couplers should be made, and for the best material and design of details has actually been made more difficult by the state laws. So far as they have had any effect it has been bad. Yet, in the face of these facts, and ignoring what has been done, and what is actually doing, Mr. Cullom proposes that a board of experts, selected by the President, shall be invested with authority to sacrifice all that the railroads have done and select an entirely new type of coupler. Of course this board may have the intelligence to choose the Master Car Builders' coupler. Then its investigations will have been

of no use. Or it may select another type of coupler. Then its investigations will have been a good deal worse than useless. In either case the board will have cost the taxpayers of the nation \$17,500 a year for the salaries of its five members, besides clerk hire, office rent, fees and mileage to witnesses and so on, and it will have delayed progress. How great this delay would be would depend considerably upon the intelligence of the board and that, of course, is a very uncertain quantity. It is almost too much to hope that a board would be appointed purely for fitness and regardless of politics.

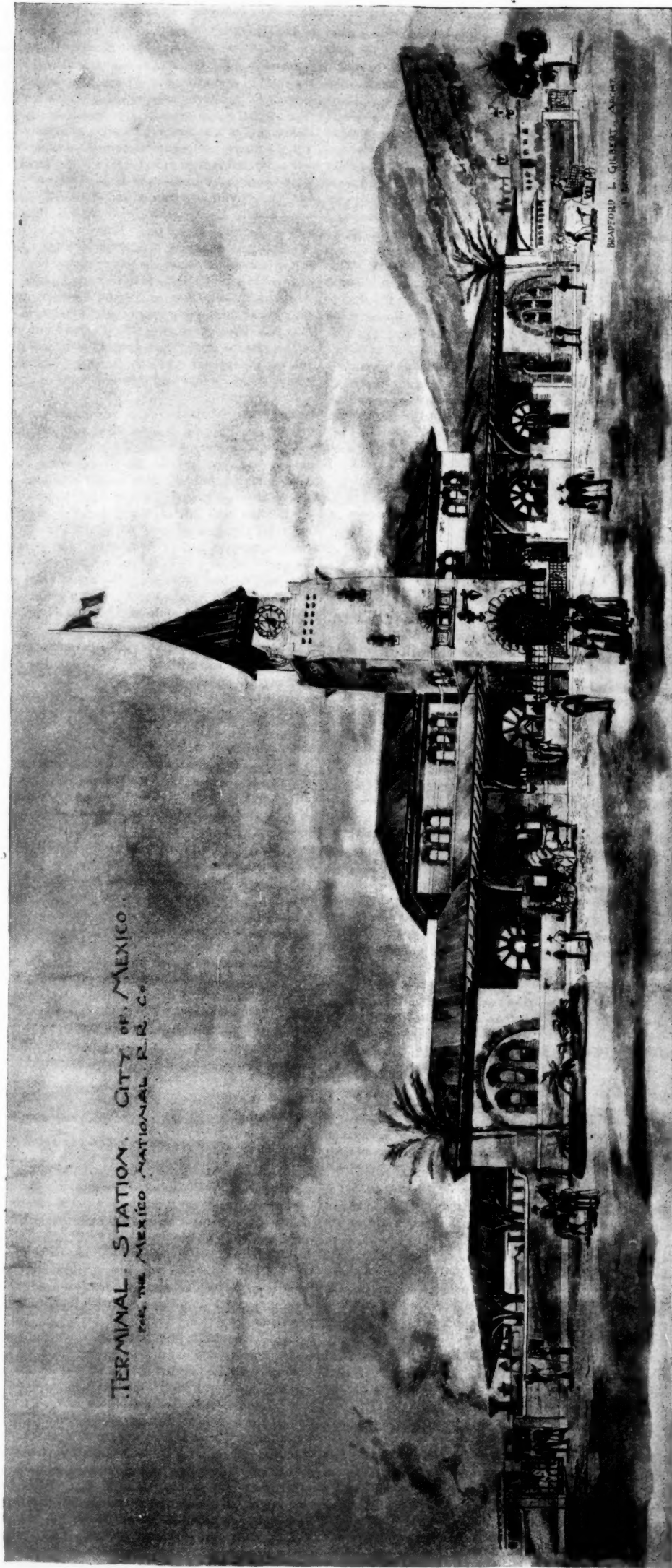
Many of the railroads accept the M. C. B. coupler as correct in principle, and as sufficiently perfected in construction to warrant its use, and are putting it on as fast as they can afford to. Others are waiting for the lessons of the great practical experiment now making with it all over the country. It is now so probable as to be almost certain that this coupler, which has been developed in a business way, and without the stimulus of any legislation, will, if let alone, within a few years be universally accepted as the solution of an extremely difficult problem. A law like the Henderson bill would probably hasten its progress. If the Cullom bill is passed the railroads will naturally stop where they are until it is known what coupler the government board will adopt. Those roads that do not wish to put on the M. C. B. coupler will have a good excuse for delay. Those that do wish to put it on will not care to take the risk of losing \$25 per car. And so the bill, besides being vicious in principle and an extremely unfortunate precedent, would actually defeat the purpose for which it is framed.

All that has been said against the Cullom bill and for the Henderson bill in the matter of couplers applies with still greater force in the case of the brake. The brake question is much further advanced than that of the coupler. While there is some reasonable ground for delay in equipping freight cars with the Master Car Builders' coupler, there is no reason but expense for not putting on the air brake. No one denies that the air brake has now been perfectly adapted for freight service. It is universally admitted that with it trains can be run with greater speed and greater safety, and more service can be got out of the rolling stock, track and men. Its success is merely a matter of intelligent use and care. The railroads are increasing their air-brake equipment with wonderful rapidity, considering its first cost and considering how recently it has been made practicable for freight service. The Henderson bill would doubtless hasten this movement also; but it would undoubtedly be delayed by the Cullom bill, which provides that the board shall "make investigation and report separately whether or not . . . automatic or power brakes are feasible in the handling and use of such [freight] cars, and if the board shall so find that it shall recommend what brake . . . it shall deem best adapted for use." This report is to be subject to further action of Congress. It will be observed that in the matter of brakes, as well as in that of couplers, the Henderson bill has two great merits. It is framed in recognition of existing facts, and it leaves the railroads free to accomplish specified ends by their own means. The Cullom bill has two great defects. It ignores the most important work done in recent years toward the adoption of safety appliances, and takes away from the railroads the right or power to choose their own machinery for carrying out their work.

Questions for Railroad Commissioners.

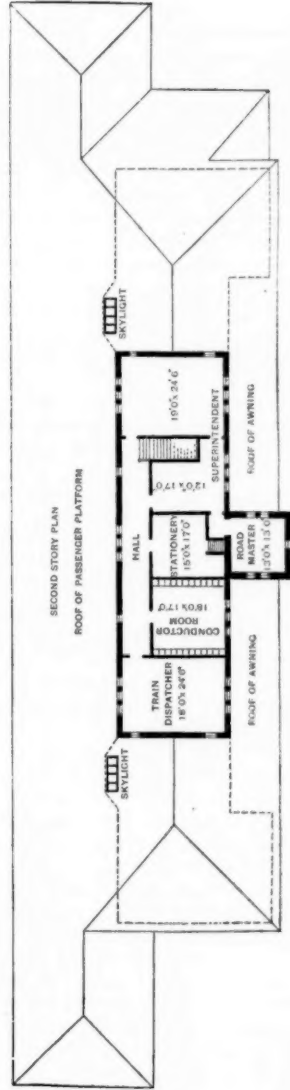
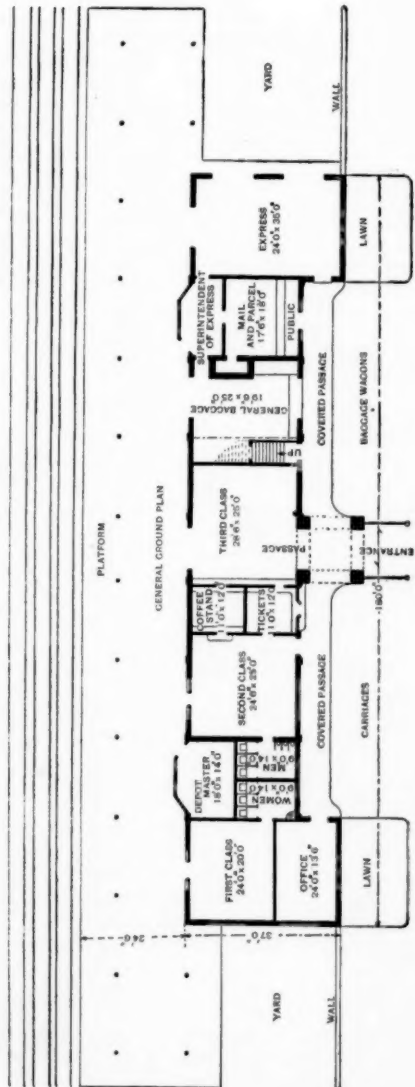
The subjects suggested for discussion, in the call for the National Convention of Railroad Commissioners, are, for the most part, nearly the same as those of last year. But there are one or two changes which are quite significant as showing the progress of public opinion during the last twelve months.

Under the head of "Railroad Construction," the question formulated a year ago was, "Should regulation be provided?" To-day we are asked, "Should state or federal regulation be provided? What should be the character of such regulation?" Of course, there is one way of reading this year's questions, under which they would mean no more than that of last year; but it is not the natural way. The impression made by the two forms of statement is wholly different. Last year the matter was presented as an open question; we were asked whether anything ought to be done. This year there is an underlying assumption that something ought to be done; the question is, what parallel roads have done so much harm to others besides those immediately to blame for their construction that almost everybody recognizes the need of some means of pre-



TERMINAL STATION, CITY OF MEXICO.
FOR THE MEXICO NATIONAL R.R. CO.

BRADFORD L. GILBERT, ARCHT.



PROPOSED TERMINAL STATION, MEXICAN NATIONAL RAILROAD, CITY OF MEXICO.



vention. This defect of the general railroad laws is far more clearly seen in 1890 than in 1889.

Another question on the schedule shows a still clearer difference from last year's programme. "How are rates to be fixed under legislative authority, in view of the rulings of the courts that the rate a carrier may lawfully charge is a judicial question?" This refers specially to the Minnesota cases, in which the unlimited right of the legislature to regulate rates was denied. The court held that charges prescribed by state authorities must not be unreasonably low. They must be high enough to afford the roads a fair compensation for the service. The court did not, as we understand it, reverse the decision in the Granger cases. It did not deny the existence of the traditional right to regulate charges in lines of business like railroads, which were subject to public use. Investors are still liable to such legislative action and to the risks which it involves. What the court denied was that this right was an unlimited one. It is subject to the limitation that the results must be reasonable for the railroads. If they are not the courts will set them aside.

Apparently this ought to answer the commissioners' question. The way to fix rates so that the courts will not set them aside is not to make them too low. The technical knowledge of a railroad commission ought to enable it to avoid this danger. If the rates which it prescribes are really defensible, it has every advantage in defending them. In any judicial inquiry, there is a strong tendency to assume that rates which have been established by public authority are *prima facie* right. The burden of proving that they are wrong is thrown upon the railroads, and, unless they are most clearly and decidedly wrong, it is not easy for the roads to make out a case under such circumstances.

But there is perhaps more behind the question than appears on its face. In nearly all of our western states there is a strong pressure behind the commissions and the legislatures to reduce rates as much as possible. The problem is how to yield to this demand as far as possible, and yet not come in conflict with the courts. It ceases to be a question of technical knowledge, and becomes one of practical politics. We do not mean that those who framed the inquiry understood it in this way; still less that they would attempt to treat the matter with that idea primarily in view. But it is none the less true that it is this political pressure which gives point to the question and makes it necessary for state authorities to ask it. To keep within judicial requirements is, as we have seen, a simple matter; but to answer the question, "How shall a state authority make rates high enough to stand the test of judicial inquiry, and at the same time low enough not to destroy all chance of reduction?" is a difficult matter indeed.

Somebody has described state commissioners as a sort of buffer between the shippers and the railroads. If the resisting power of the railroads is stiffened up by a Supreme Court decision, while the impact of the shippers is as violent as ever, it makes hard work for the buffer. It is this state of things which gives pertinence to the question of the commissioners, and which at the same time makes it so hard to find a satisfactory answer.

American and English Locomotives.

II.

The relatively high wages paid in the United States for all classes of labor, and the great distances passengers and freight must be carried in single trips or without breaking bulk, have been perhaps the most important elements in developing our methods of operating. It has been found cheapest and best to run heavy trains, and the weights of trains have been steadily increased. In the weight of trains hauled is found the fundamental difference between American practice and that of England and continental Europe. Whether our theory of operation has been right or wrong, the fact is that we carry freight at a very much lower rate per ton mile than any other country in the world. The average rate is less than half that of England, about 55 per cent. of the French and Italian rates and 68 per cent. of the Prussian rate. The conditions of operation in South America and in the principal British colonies are closely analogous to those of the United States, and it is doubtless true that those countries will find it advantageous to adopt our methods, rather than those of England and the continent. But fuel economy has been but one of the elements considered in reducing operating expenses; and the American locomotive has been developed with a view, first, to great power and efficiency, low cost of construction and maintenance and simplicity of parts. We must not be surprised, therefore, if it is found to

burn more coal per engine mile or even per ton mile than the English locomotive.

In a previous article on this subject we referred to the difficulty of increasing the ratio of the heating surface to load hauled as the power of the locomotive is increased. The older types of American engines weigh about 54,000 pounds on the drivers and have about 1,200 square feet of heating surface. The newer types have from 1,400 to 1,500 square feet and weigh 90,000 to 120,000 pounds on the drivers. The ratio of the heating surface to the weight in the first case is as 45 pounds to one square foot, and in the second case is 64 to 80 pounds to one square foot. It will be seen that the amount of heating surface per ton of adhesion weight is less than it used to be. If we consider the adhesion weight as indicative of the amount of work which a locomotive is capable of doing, it follows that our later types of engines have not as much heating surface for the same amount of duty performed as the older types; and were it not for the better disposition of heating surface our later engines would not be as economical as they are. So with the English engine when compared with the American the heating surface per ton of adhesion weight is great. For instance, the heating surfaces in certain standard engines are as follows:

Pennsylvania Class A.....	1,052 sq. ft.
" Class A, anthracite.....	1,205 " "
" Class P.....	1,330 " "
Chicago, Burlington & Quincy Class H.....	1,506 " "
Michigan Central 10-wheel express.....	1,670 " "

These engines haul trains of from 300 to 500 tons at good express speeds. In the following English engines the heating surfaces are:

London, Brighton & South Coast.....	1,500 sq. ft.
Webb compound.....	1,457 " "
Worsdell ".....	1,139 " "

Other English engines have heating surfaces near these figures, and yet the train load will not average 200 tons, and rarely exceeds 250. This difference in heating surface has a marked effect upon the economy of the locomotive, and if the English engines had sufficient capacity to haul the train loads which are hauled here and were put in the same service, their economy would be decreased below that of our own engines because of the insufficient grate surface that could be got in their designs. Not only would they have to be increased in weight and boiler diameter, but they would have to be materially changed in type. In our locomotives we have only been enabled to maintain a reasonable economy by enormously increasing the grate area. The greatest economy of fuel is not to be expected in locomotives which are hard pushed and on the grates of which the fuel burned has to be in the neighborhood of 120 lbs. per square foot per hour. Put English engines on the limited trains, or any of the freight trains leaving Altoona, on the Pennsylvania Railroad, going west, and it will be found that their fuel consumption when they satisfactorily pull the train will more than equal that of our own engines for obvious reasons, the principal of which is that they are not adapted to what we call hard work. All these facts must be considered in talking of the water evaporated per pound of coal. The *Engineer* lately said:

Any American engineer of experience will tell our contemporary that the American locomotive boiler in regular work evaporates about five pounds or six pounds of water per pound of coal. That must, indeed, be a poor English locomotive that does not turn eight pounds of water into steam per pound of coal.

This statement only indicates that English engines have but little work to do in proportion to their heating surface, and indicates light trains and level roads, or else it shows that the boilers prime badly and a large amount of water is really unevaporated and passes in this form into the cylinders. We have some such engines here, but not many.

There are other points of difference between the English and American designs that must be considered. The question of inside and outside cylinder engines has other points than those which are generally mentioned. Inside cylinders would never do for our uses, particularly on the newer types of express locomotives having six driving wheels. No one would for an instant think of putting the cylinders so far ahead and carrying so much weight upon the truck as would be necessary to put inside cylinders on a 10-wheel or mogul locomotive. It is not in keeping with the most advantageous changes which we have made in our express locomotives, which are to shorten the total wheel base and to add a third pair of drivers. Such construction precludes the use of inside cylinders and crank axles on American roads.

It is generally claimed by English constructors that placing steam chests and valves inside the frames in the vicinity of the smoke box has the advantage of slightly superheating the steam. That this is a

fallacy can readily be shown by placing a thermometer in the locality which is supposed to be occupied by the valve seats, when it will be found that the effect of the heat in the smoke box is practically inappreciable. The disadvantages of inside steam chests are numerous. If the cylinders are placed inside, as well as the steam chests, then the area in the throat of the steam chest valves is cramped to a degree not reasonable in good steam engineering practice. To the contrary with outside cylinders, our valves have been raised from 1½ to 2 in. within a few years, there being ample room for such changes, with a marked advantage of freedom in exhaust.

If the English engines had to blow their fires as hard as ours do, they would soon find the difficulty with their inside cylinders and cramped valves. Sometimes English designers have used inside steam chests on locomotives for foreign trade when the cylinders are placed outside. This was done on some English engines a few years since. The clearance in the cylinders became something enormous, and the resulting loss is exceedingly detrimental. No stationary engine would be considered for a moment which had the amount of clearance that the designs mentioned necessitated.

The inaccessibility of the valves on inside cylinder engines has always been cited against them, and recently Mr. Aspinall, of the Yorkshire & Lancashire, has developed a design to obviate this difficulty; but still the valves are cramped in the throat. If such a design was adapted to American engines with its 2-wheel or 4-wheel swiveling truck and pilot, the valves would be found to be in such a position as to make it impossible to reach them in case of a break-down on the road. To block up a port when necessary to run in with one side only would be next to impossible. This point being settled, it seems to carry with it the conclusion that inside cylinders must be abandoned for new countries, not because of lack of economy in operation, but because of inaccessibility and other undesirable arrangements resulting from the design.

The crank axle necessarily goes with the inside cylinder locomotive. Any one who is interested in such engines needs simply to go to the railroad shops in England and he will find that, owing to the breakages of such axles, ponderous masses of iron are used for the cheeks of the cranks. One of the latest designs is that of Mr. Worsdell, who uses a complete circle of metal for a crank, this having been found by him to be the only satisfactory and durable design. On the Midland they are using enormous cranks reinforced with straps in a manner that is not only expensive, but indicates a weakness of crank axles as a rule. Regarding the crank axle, Mr. M. Barker, in a paper on "Locomotive Repairing," read before the Engineering Students' Club, Newcastle-on-Tyne, says:

The art of designing a crank axle which can be depended on with any certainty has yet to be learned. The subject can only just be glanced at in this paper. It can safely be said that any axle yet designed will in time break, not owing to the wear of any part reducing its strength, but to the constant bending backwards and forwards of the axle, and the strain produced in running over an uneven road or round curves.

Attention might be called to other details. For instance: If one takes an oil can and starts to oil an American locomotive, he can do reasonably good lubrication even if he is wholly unacquainted with locomotives. The parts are all accessible, are readily seen, and few in number. On the other hand, the same individual would find it difficult to oil or reach the majority of the bearings of an English locomotive, owing to the plate frame, particularly on locomotives with wheels of American sizes. With an 8-ft. wheel one can crawl under the locomotive and find the bearings. In most cases English locomotives have their bearings piped to a point where they can be readily reached, but it presupposes much skill and care on the part of the runner to keep the pipes free and the bearings well lubricated.

The English engine has its good points. No American engineer, who has examined the methods of construction and design will for an instant dispute this. Among these may be mentioned as the principal ones the large bearing surfaces and the boiler construction. The larger bearings are undoubtedly advantageous, but the methods of arranging them are not. For instance, comparing driving boxes, shoes and wedges, the English are made with large surfaces, without adjustments in most cases; the American are made with somewhat smaller surfaces, with ready adjustments. The superiority of the adjustable bearing is beyond question. No one here would think for an instant of making a driving box without adjustable shoes and wedges, even if the surfaces were much larger than they now are. In some cases in English practice the driving boxes are of wrought iron, case hardened. When such work is properly done and well

ground to dimensions after hardening there can be no question of its value in decreasing the wear, but the cost is much greater than that of the cast-iron boxes used here, and there is a limit to the increase of cost that is economical. Further, the cast-iron box is by no means the best box used here. We have the composition and phosphor-bronze box, that is much more durable and stronger than the cast iron, or even the wrought iron case-hardened, and when it is worn out it has a good value as scrap. However, it is not proved that it is the best box to use.

Regarding journals, there is a point of difference between the English and American journals, other than size, that should be mentioned. The English builders in many cases harden their journals by a process similar to case-hardening or cementation. Many engineers have thought the plan to be new and good, and that perhaps we ought to use it here. To the contrary, it is not new here. For years we have used case-hardened iron crank pins, and so little advantage has resulted from their use that they are now seldom called for. Steel has quite universally taken the place of all other materials for journals of large diameter, and the reasons are good. One is that steel wears uniformly, while case-hardened iron does not. Another is that steel is much cheaper, in many shapes being less in cost than the wrought iron before it is hardened. Still another, and probably the most important, is that we prefer to remove a journal occasionally to true it up easily, rather than to have it run a little longer, and spend several times as much money grinding it, when hardened, to a true form; and in some cases grinding through the hardened skin, thus necessitating a re-hardening or entire removal of the axle or pin. We all know what trouble arises from a journal with a hard and soft side on it. Nor is this all; steel is stronger and more uniform. It will be used after iron has been discarded. As steel journals cannot be safely hardened—in fact, it would be folly to attempt to harden a steel axle or crank pin for a locomotive—there seem to be good reasons why we should not use hardened journals.

All this leads up to a general statement of principles of construction as related to repairs. There are two lines to follow up to get a locomotive that will give a minimum cost of repairs: (1) Build with a view to simplicity and accessibility of parts, and with a view to the greatest facility in renewing or repairing all parts; or (2) so increase the dimensions and the hardness of the parts as to give them the longest possible life before needing repairs. The first line is that on which the greatest improvements are to be made. It gives the greatest scope for originality and ingenuity, and is the line on which American designers have achieved their greatest successes. The physical and financial limits of the second line are quickly reached. It is obvious that increased durability may be purchased at too great a first cost, and there is always a tendency to avoid replacing expensive parts, and to allow such parts to be used after they are in a condition that is uneconomical. Supposing, for instance, that locomotive slide valves made of a composition at 25 cents per pound would wear twice as long as cast-iron ones—which they do not—how would they compare in cost per engine-mile with cast iron at 24 cents?

Many such illustrations are readily found going to show that additional expense for more durable parts should be well considered before being incurred, or there may result a greater ultimate cost per locomotive mile. The English locomotive, with its case-hardened journals, composition valves, brass tubes and copper fireboxes, costs considerably more than our own, the difference being from 25 to 35 per cent., and often 50 per cent., for locomotives of equal hauling capacity, and it may well be doubted if the increased durability offsets the increased first cost.

It goes without saying that we want better and more durable locomotives. Everybody always wants to buy more for his money. But it does not follow that any other country builds better locomotives than we do. On the contrary, any unprejudiced engineer examining all types of locomotives would not hesitate to say that, for our service, our engines excel all others. To sum up, if the point to be gained is a decreased cost of repairs and minimum cost per mile run during life, we have three ways to get it, the first two of which are the most promising:

1st. Design the engines to be easily overhauled and quickly repaired, keeping duplicates of all parts in stock.

2d. Supply the most convenient facilities for taking apart and repairing locomotives, so that duplicates may be put into position in the least possible time.

3d. Increase the dimensions of parts and the hardness of the material as far as real economy will permit.

Automatic Block Signals on the Boston & Albany.

The Boston & Albany has begun the erection of 86 new automatic signals, which, when put in use, will complete the equipment of the line between Boston and Springfield, 98 miles, and this section will then be more perfectly equipped with automatic signals than any other of its length in the country; and there is probably no road in the world on which trains can be blocked for such a great distance without the aid of signalmen.

As a plant of this magnitude will be a matter of considerable interest, it is worth while to give a few particulars. The line from Boston to Riverside, 11 miles, is four-track; thence to Springfield, 87 miles, it is two-track. The four-track road is already equipped with continuous overlapping track-circuit signals of the Union pattern. On the next 33 miles, to Worcester, there are Hall wire-circuit signals at each station. For the next 54 miles, comprising the second division, there are Union track-circuit signals at nearly every station, the length of track protected at each varying according to the needs of the respective stations, the average being perhaps less than a mile. The new signals now being put in are to fill in the spaces hitherto unprotected, between Riverside and Springfield, so as to make a continuous block system, each section overlapping the section in advance enough to provide practically a quite effective distant signal. There will be 52 new Hall signals and 34 of the Union pattern. The second division will be signaled exclusively with the track-circuit instruments, and the equipment of the line between Riverside and Worcester will be exclusively wire-circuit. A space of two and a half miles at Worcester and half a mile at Springfield is omitted from this scheme, much of the track being included in yards, where automatic signals are of doubtful value. These yards are partially covered by semaphore signals interlocked with the switches, and will probably soon be entirely so covered.

From the location of the signals it would seem that the plan on which their arrangement is based contemplates what is essentially a cautionary system. Although the theory of both the systems used is admirably adapted to an absolute block system, by which trains may be separated by a definite space interval, and under which flagging is theoretically unnecessary, the location of the signals and the length of the block sections is such that absolute blocking cannot be carried out economically. It is evidently intended that the signals shall be an aid to the flagman rather than that the flagman shall be converted into an auxiliary safeguard to a complete block system. For instance, between Springfield and Worcester, on the eastbound track, nearly all the block sections are 2 miles long, or a little less than that; and yet there are one of 3 miles and one or two others of nearly the same length, so that the value of the short blocks as a means of permitting trains to follow each other more closely than could be done under the flagging system, is considerably neutralized. On the westbound track on this division the longest block section is about 2½ miles, the average being slightly less than on the eastbound. East of Worcester, where passenger trains are somewhat more frequent than on the second division, and where blocks would therefore naturally be shorter, one section on the westbound track is 3½ miles long and another 3 miles. On the eastbound track there is one of 3 miles, while yet on both these tracks the majority, as in the previous case, are 2 miles or less. That the predominating idea is as we have assumed is evidenced by the fact that the exceptionally long sections are either on long tangents or on ascending grades where trains run slowly, and where even a lazy brakeman may be expected to protect his train. But even with these drawbacks the system will be a great advance on ordinary practice. Even three-mile blocks are shorter than most roads think they can afford to operate. On lines like the Lake Shore and the Wabash, which block by means of their regular telegraph offices, the sections are four or five miles long, and even on considerable stretches of the Pennsylvania this is the case. So that, as the Boston & Albany has made nearly all of its cross-overs trailing-points and has provided substantially all its switches on the main line with a distant protection of some kind, the Boston-Springfield section will now be one of the best protected roads in the country. By the establishment of a regular block system, with attendants, at five or six of the important yards where automatic signals, although valuable, do not remove the necessity for reducing the speed of fast trains, trains could be run over the whole of these two divisions under a practically complete block system.

The question of free cartage, as brought up at Grand Rapids, Mich., and as reported in our traffic columns last week, seems to have stirred up a very warm discussion in the Interstate Commerce Commission. The full report shows that Chairman Cooley wrote the opinion, deciding simply that the long and short haul clause of the law was violated by charging 75 cents from New York to Ionia, while freight was taken at the same price to Grand Rapids, 34 miles further, and there delivered by wagon at consignees' stores. The peculiarities of the case are that the Detroit, Grand Haven & Milwaukee had performed this free cartage at Grand Rapids for 25 years, and long before it had a competitor there. Its station is 1¼ miles from the business sec-

tion of the city, while those of the other roads are only about ¼ mile out. The complainants, though merchants in Ionia, were really put up to make the complaint by the Michigan Central, which suffers at Grand Rapids from this peculiar competition. Concerning the prevalence of the practice of free cartage, the report simply says that "it is more or less extensively practiced in Michigan and other states at exceptional stations." Commissioners Morrison and Schoonmaker concurred in this report, but they deem it important to add that the free carting is in effect a rebate and an evasion of the law regardless of its relation to the price charged to Ionia or any other place. (Chairman Cooley says "it is not pretended by complainants that free cartage is in itself illegal," and he apparently agrees with them.) Commissioner Veazey did not sit on the case, but Commissioner Bragg fills up 25 pages with a dissenting opinion, in which he labors to show that, as free cartage has been long practiced at many places, and has worked harm to no person, firm, locality or description of traffic, it will therefore be upsetting things unwarrantably to decide now, on any ground, that it is illegal. He foresees difficulty in deciding in future cases what must be the average distance from a depot to the business portion of the town; in requiring carriers to raise their rates to suit a rival; in meeting the complaints of other towns, and so on. He says the two cents per 100 lbs. paid for cartage is really a part of the cost of transportation, the same as would be the money spent for building a particularly large or costly freight house. It appears that the allowance of this cartage charge is not mentioned in the tariffs, but Commissioner Bragg holds that, as this is merely an item of cost of service, that fact, is not material.

None of the commissioners discusses the essence of the real reason for holding this business illegal, which is that a railroad has no right to transport freight beyond its own chartered line. Chairman Cooley says "it is the rule for a road's service to end at the freight house," and challenges any one to tell the Commission how to define the maximum and minimum distances within which a railroad may perform cartage, but he dismisses the subject with a short paragraph. Commissioner Bragg laboriously compares this case with lighterage at New York, with switching charges in placing cars on private sidings, and other cases of more or less exceptional service; but the fact that one road has a charter to build a road into the heart of Grand Rapids and actually constructs the road and uses it, while another stops a mile out of town and practically extends its road into the town by wagon, without a charter, is not stated or considered. There is much unnecessary reasoning on the relative value of terminal facilities, the attitude of competitors toward each other, and other cogent matters, but the important point that a road which builds its line outside of a town must not pretend that its road runs into the town is left untouched. Commissioner Bragg says that if the Detroit, Grand Haven & Milwaukee were now forbidden to abandon this practice of 25 years' standing, it would probably lose much of its business to its rivals, the Michigan Central and the Detroit, Lansing & Northern. So far as we can see, it ought to suffer such loss; else what incentive is there for new roads to provide new accommodations?

A Denver paper of April 30 printed the following:

The sudden action of the different roads in withdrawing cut rates from Eastern points to Denver caught the big shippers napping, as it were. They had been holding off all heavy shipments for weeks, fully confident that rates would go to pieces, when they would rush in large stocks at about one-fifth of the usual cost. The reduced rates were never made public, hence the roads can withdraw them at their own sweet will, and that is just what they did, to the sorrow of many Denver merchants. One of the biggest shippers spent the entire day yesterday endeavoring to contract for 25 cars of freight from New York, and in the afternoon the sad realization dawned on him that it was too late. A week ago he could have secured a rate of \$1.20 from New York, but now he will have to pay the full tariff rate of \$1.90.

This is a sample, more definite than most of those we see, of the allegations that rates are unlawfully reduced. Secret and unpublished reductions and advances in rates are, of course, illegal, and the road making them is liable to punishment. As for the other party to the fraud, Section 10 of the Interstate Commerce law provides that any person for whom, as consignor or consignee, a carrier shall transport property, who shall knowingly and willfully, by any means, with or without the connivance of the carrier, obtain transportation for property at less than the regular rates, shall be deemed guilty of fraud and subject to a fine of \$5,000 or two years' imprisonment, or both.

Now, after this "big shipper" has spent a day in fruitless labor, why does he not get the guilty party punished by reporting to the officers of the law who it is that gets secret rates and when, and from what road? Again, as the Interstate Commerce Commission cannot readily take cognizance of affairs in all parts of the country, why should not the United States District Attorneys take up matters of this kind when they appear so circumstantially in the public prints?

The decision of the Interstate Commerce Commission, in favor of the Pennsylvania Railroad, denying the demand of the Worcester Excursion Car Company that its cars be hauled by that road, is based principally upon

the inconvenience and possible danger of running a car of unusual type, especially as regards couplers, upon a line where materials for repairs are not kept in stock, and where any slight breakage might result in delay, if not accident, to a considerable number of important trains. In the words of the decision, "an accident to such a car might often cause damage to such an extent that the owners of the excursion car would be unable to make good to the carrier the damages sustained." This last is the practical point, as, if the applicants were able and willing to pay a proper price, it would seem at first sight to be for the interest of a railroad company to haul anything that might be offered, whether it were an ox cart or a steamship; but practically the Pennsylvania's position is undoubtedly sound. The advantages in the way of safety of trains, security to passengers and regularity of movement secured by years of growth and the expenditure of millions of dollars for perfected wheels, rails, bridges, signals, locomotives and other appliances are not to be lightly set aside. When the Queen of England travels over the London & Northwestern, freight trains in both directions are side-tracked for an hour, switches are spiked and highway crossings are walled up (almost); but we are not sure that it is proper to thus vary the ordinary regulations, even for a queen; certainly not for mere money kings, such as travel in private cars here. The Pennsylvania, if it were compelled to haul an odd car, would probably insist on running it in a special train, but a special train is in the nature of things liable to many dangers that do not beset a regular train.

The competition for the Washington business continues to increase the speed of trains. The Pennsylvania Railroad announces that after May 11 the time of the "Congressional Limited" from New York to Washington will be reduced to 5 hours and 5 minutes. The present time is 5 h. 20 min. Allowing 13 minutes for the ferry from New York to Jersey City, the running time of the train is 4 hours 52 minutes. We assume that the train does not run into Broad Street Station, Philadelphia, and deducting the distance in and out of Broad Street Station from the distances given in the Pennsylvania time tables, we make the total distance from Jersey City to Washington 224.53 miles. The speed, including stops, will be, therefore, 46.1 miles per hour.

The Baltimore & Ohio will also accelerate its 3:20 p. m. train, reducing the time to 5 hours, the distance being 225.3 miles. Deducting 12 minutes for the Jersey City ferry, and 10 minutes for the Canton ferry, the speed, including stops, will be 48.6 miles per hour. This will doubtless be the fastest train in America for the distance, and we doubt if another train can be found in the world that runs 225 miles at this rate, including stops. There will be no stop between Philadelphia and Canton, except at Newark, Del., for water. This stop will be avoided as soon as track tanks are completed, which will probably be about the middle of June. There will be no stop between Locust Point and Washington.

The Massachusetts Railroad Commissioners have recently decided in favor of the Old Colony in a case where both that road and the New York & New England applied for authority to construct a short piece of new railroad over substantially the same ground. The proposed line is chiefly for the benefit of the town of Walpole and its prospective business seems to be wholly local. The New York & New England made a survey in 1883 and then allowed the matter to drop. Last year the Old Colony put engineers in the field, and at once the New York & New England resurveyed the line and presented its petition to the commissioners 12 days in advance of its competitor, not waiting for its engineers to make a final report. The board decides, however, that, although the New York & New England will suffer more loss of business if the road is built by the Old Colony than would the latter if the former built the road, the preponderance of testimony among the communities to be benefited by the new road demands that the Old Colony's application be granted, and the decision is thus issued.

It seems that the official notice requiring the Trunk lines to revise their tariffs in accordance with the railroad rate decision of the Interstate Commerce Commission, has not yet been issued by that body, and the roads therefore have not indulged in culpable delay, as has been intimated in certain published statements. Several conferences have been held, and there is a disposition on the part of all concerned to arrive at some agreement, if that is possible; but no practicable plan of overcoming the difficulties outlined in our article of last week has been presented. It is to be observed that the Trunk lines make their through rates to Chicago and to interior points beyond their own western termini only by consent of the interior roads; and these roads, not having been made defendants to the complaint on which the present decision was issued, are of course not bound to take any different course from that pursued by them before the case came up. If the Trunk lines were to follow the letter of the decision issued by the Commission, and the interior roads persisted in disagreeing to any change, the effect would be to abolish through rates to points beyond Buffalo, Pittsburgh, &c.

A Chicago dispatch announces that the Michigan roads will, on May 15, carry into effect their intention, heretofore

announced, of advancing their passenger rates to the basis in effect previous to the enforcement of the law limiting fares to two and three cents a mile, according to gross earnings. The recent Supreme Court decision in the Minnesota case is relied upon as a defense in case legal proceedings are instituted to compel compliance with the law. So far as we can learn the Chicago & Grand Trunk is the only line which will actually defy that statute. The Michigan Central and the Lake Shore & Michigan Southern are exempted by special provisions of their charters, and reductions on several other lines were made, not directly because of the law, but to compete with the Chicago & Grand Trunk. The Michigan Central line between Detroit and Toledo is affected by the law, but we understand that that road has not decided to make any change at present.

The Interstate Commerce Commission has decided, upon the petition of the Seaboard Air Line, that the road is not obliged to pay advance charges to a steamship line. The line of steamships between New York and Wilmington makes through rates to interior points on the Carolina Central Railroad; but this is done without authority of the railroad, the two local rates being simply added. The road objects to this, and refuses to pay accrued freight charges on shipments delivered to it, and the commission decides that one carrier is not obliged to advance charges to another except by agreement.

We are glad to hear of at least one practical step toward reducing the number of rail sections in the United States. The Chicago, Burlington & Quincy and the lines of the system, have adopted as a standard 66-lb. rail the new Northern Pacific section of that weight. They have not adopted, however, the Northern Pacific angle bar and drilling. This rail is very similar to the Michigan Central 80-lb.

NEW PUBLICATIONS.

Passenger Traffic and Accounts, by M. M. Kirkman, Chicago.

This is a book which Mr. Kirkman is soon to issue, covering the field indicated by the title and giving the results of study and reflection since the publication of his earlier books on the same topic and embracing new facts. We have been favored with advance sheets of some of the chapters, which, however, we are unable to reproduce on account of their length. It is hardly necessary to say that Mr. Kirkman has treated the subject in his usual exhaustive manner. He says in a prefatory note that this work, like most of his previous productions, is intended for young, industrious and ambitious men, and not for old experts or those whose minds are already made up. Chapter I, which fills six or eight pages, is devoted to a consideration of common carriers from the remotest antiquity. Mr. Kirkman has read Herodotus and other historians, but finds that the details of their methods of travel are sadly lacking. The salacious practices of ancient Babylonians, the concupiscence of hares and cats and the virility of vipers are carefully described, but whether the monarchs of that time traveled on unlimited tickets or signed ironclad contracts; whether they "stood in" with the scalpers or strictly observed the letter and spirit of the Acts to Regulate Commerce which were then in force, is left in a state of uncertainty which is exceedingly annoying to the historian. We have looked in vain for a facsimile of ticket, form U. L. 1, Joppa to Tarshish. It is possible, however, that Jonah, having a realizing sense of the small salaries of ticket-takers in those days, paid a cash fare. From such material as is available, however, Mr. Kirkman gives us an entertaining account of the methods of traveling in the time of Noah, Tiglath Pileser, Assurbanipal, Xerxes, Megabazus, Alexander of Macedon, Cyrus, and on down to Cunard and Vanderbilt. The succeeding chapters come down to the affairs of our ordinary life, and take up the history of tickets and the method of dealing with them since the opening of the present railroad era. In Chapter V. the author very candidly tells the reader that he has learned a good many things since his first books were printed, and he gracefully retracts several "statements which were extremely silly, gratuitous, unnecessary and absurd!"

Annuaire des Chemins de Fer; 1890. Paris: E. Dentu. Price 2 francs.

This publication gives lists of the officers of all the railroads of France, with maps of the various systems and considerable statistical information. The organization of the various bureaus of the Public Works Department having to do with railroads is also given. The volume gives a good account of the pension systems of the companies and of the Mutual Aid Societies of employés, abstracts of laws and regulations and tables of freight tariffs and passenger fares.

LOCOMOTIVE BUILDING.

The Cincinnati, Hamilton & Dayton is reported in the market for five locomotives.

The Alabama Great Southern has just received three heavy passenger engines from the Baldwin Locomotive Works.

The Georgia Southern & Florida has ten engines under contract at the Rhode Island Locomotive Works.

The Duluth & Winnipeg has purchased four locomotives from the Duluth, South Shore & Atlantic.

The plant of the Portland Co., Portland, Me., has been sold to a syndicate of Portland people, composed of C. R. Milliken, W. L. Putnam, W. F. Milliken, Elias Thomas, W. T. Dunn, D. W. Kensell, C. S. Fobes and others. The price paid was par. The purchasers are to receive the May dividend.

CAR BUILDING.

The Fall Brook Coal Co. will probably soon award the contract for building 400 freight cars.

The Beech Creek Road has let the contract for 500 30-ton hopper cars.

The Chattanooga Union has ordered 12 passenger cars, six to be of the elevated railroad pattern and six of them ordinary coaches.

The Eastman Car Heater Co. has 50 cars built at the Harrisburg Car Works.

The Pullman Palace Car Co. is constructing a number of cars for the Delaware, Lackawanna & Western, for use between New York and Buffalo, which are to be equipped with the Pintsch gas lighting system.

The Lafayette Car Works of Lafayette, Ind., are building 40 ore cars for the Duluth & Iron Range road.

BRIDGE BUILDING.

Alder Point, Cal.—The Board of Supervisors of Humboldt County, Cal., will receive proposals until July 15, together with plans and specifications, for building a bridge across Eel River at Alder Point. O. D. Stern, Eureka, Cal., is Clerk of the Board.

Atlantic City, N. J.—The New Jersey Steel & Iron Co., of Trenton, N. J., is building three drawbridges to be erected near Atlantic City.

Blocton, Ala.—Work has begun on the iron superstructure of the bridge across the Cahaba River, near this point, being built by the Briarfield, Blocton & Birmingham road. The two main piers are of stone and 70 ft. high. The total length of the structure is given as 1,300 ft.

Fordham, N. Y.—The Park Commissioners of New York City this week approved the plans for a bridge to be built by the New York & Harlem road, over its depressed tracks at Fordham. The bridge will be 100 ft. wide.

Kentucky.—Bills have passed the Kentucky State Legislature incorporating the Kentucky & West Virginia Bridge Co., the Louisa & Cassville Bridge Co. and the Elkhorn & Big Sandy Bridge Co.

Macon, Ga.—Discussion has been renewed in relation to the proposal to bridge the Ocmulgee River at the foot of First street, in Macon.

Monticello, Miss.—Proposals will soon be asked for building a bridge at Monticello, to replace one recently destroyed by high water.

New York City.—The Board of Estimate and Apportionment has approved the plans for the viaduct at 155th street, and bids will be advertised for. The estimated cost is \$600,000, which will be paid by the city and the owners of neighboring property. The viaduct is to extend from Seventh avenue at McComb's Dam bridge to St. Nicholas Place on Washington Heights.

New York City.—Judge Greene's bill incorporating the New York & New Jersey Bridge Co., for the purpose of constructing a bridge between New York City and New Jersey, became a law in New York State on April 30 without the governor's signature, on the expiration of the ten-day limit.

Pittsburgh, Pa.—The contracts have been let for the iron superstructure of seven of the nine county bridges mentioned April 25. The contracts for six of the structures were awarded to the Pittsburgh Bridge Co., of Pittsburgh, Pa., at the following prices: No. 1, \$1,254; No. 3, \$1,520; No. 5, \$1,900; No. 6, \$893; No. 7, \$1,580; No. 9, \$32,900—aggregating the sum of \$39,653. The Penn Bridge Co., of Beaver Falls, Pa., secured the contract for No. 4, the price being \$1,925.

St. Charles, Mo.—Articles of incorporation have been filed with the County Clerk of St. Charles County by the Ponton Bridge Co.

Sioux City, Ia.—A temporary pontoon bridge will be built across the Missouri River at Sioux City, by the Pacific Short Line.

South St. Paul, Minn.—The President has approved the act for a bridge across the Mississippi River at South St. Paul. The bill authorizes the appropriation of a sum sufficient to construct a railroad and wagon bridge across the river at a point near the stock yards, estimates to be furnished by the government engineers and work to be commenced within one year.

Sylacauga, Ala.—Work is in progress for the foundations for an iron bridge to be built over the Coosa River, near Sylacauga, by the Anniston & Atlantic.

Various Projects.—The Cleveland, Cincinnati, Chicago & St. Louis is to build four new iron bridges on its Kankakee & Seneca division.

Vernon, Fla.—The County Commissioners of Washington County have ordered another bridge to be built across Holmes Creek, on the road to Chipley; also one to be built across Alligator Creek, on the Bonifay & Chipley road.

Wheeling, W. Va.—The steel railroad bridge over the Ohio river at Wheeling is rapidly approaching completion. The last span is being placed in position, and by May 15 the work will probably be completed. The bridge is 2,097 ft. long and approaches over 700 ft. long. The channel span is 325 ft. long and 90 ft. high. The bridge is being built by the Wheeling Bridge & Terminal Co., and was described in our issues of March 3, 1889, and Jan. 19, 1890, under "old and new roads."

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Alton, quarterly, \$2 per share on the common and preferred stock, payable June 2.

Chicago, Burlington & Quincy, quarterly, 1½ per cent., payable June 15.
 Cincinnati, Hamilton & Dayton, 1½ per cent., payable April 30.
 Pennsylvania, semi-annual, 2½ per cent., and extra ½ of 1 per cent., payable May 25.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlantic & Pacific, annual, 15 Broad street, New York City, May 15.
Burlington, Cedar Rapids & Northern, annual, Cedar Rapids, Ia., May 27.
Canada Southern, annual, St. Thomas, Ont., June 4.
Canadian Pacific, annual, Montreal, P. Que., May 14.
Chicago & Eastern Illinois, annual, Chicago, Ill., June 4.
Chicago & Northwestern, annual, Chicago, Ill., June 5.
Chicago, Rock Island & Pacific, annual, Chicago, Ill., June 4.
Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 7.
Cincinnati & West Virginia, special, United Bank Building, Cincinnati, Ohio, May 12, to vote upon a proposed increase of the capital stock.
Cleveland, Lorain & Wheeling, annual, Cleveland, O., May 14.
Delaware & Hudson Canal, annual, New York City, May 13.
Denver & Rio Grande, annual, Denver, Col., May 27.
Des Moines & Fort Dodge, annual, Des Moines, Ia., June 5.
Louisville, New Orleans & Texas, special, Memphis, Tenn., June 5.
Middletown, Unionville & Water Gap, annual, New York City, May 26.
Milwaukee, Lake Shore & Western, annual, Milwaukee, Wis., June 11.
Missouri, Kansas & Texas, annual, Parsons, Tex., May 21.
New York & Harlem, annual, Grand Central Depot, New York City, May 20.
Pittsburgh, Fort Wayne & Chicago, annual, Pittsburgh, Pa., May 21.
St. Joseph & Grand Island, annual, Elwood, Kan., June 10.
St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 2.
Southern California, annual, Los Angeles, Cal., May 14.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Mechanical Engineers* will hold its twenty-first annual convention at Cincinnati, O., May 13.

The *Railway Station Agents' Association* will hold its next annual convention at Cleveland, O., May 21.

The *State Railroad Commissioners* will hold a national convention in Washington, D. C., May 25.

The *Association of American Railway Accounting Officers* will hold its next annual meeting at the Stockton Hotel, Cape May, N. J., July 9.

The *Master Car Builders' Association* will hold its next annual convention at Old Point Comfort, Va., June 10. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.

The *American Railway Master Mechanics' Association* will hold its next annual convention at Old Point Comfort, Va., beginning June 17.

The *National Association of General Baggage Agents* will hold its next annual convention at Chicago, Ill., July 16.

The *Traveling Passenger Agents' Association* will hold its next annual convention at Buffalo, N. Y., August 19.

The *New England Roadmasters' Association* will hold its eighth annual meeting at Boston, Mass., Aug. 20 and 21.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the Fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Railway Master Mechanics' Association.

The committee appointed at the last meeting of the association on "The Present Status of the Automatic Car Coupler Question, and whether the Association can endorse the action of the Master Car Builders' Association in recommending the vertical plane type as a standard form for mechanical standpoint," desires answers to the following questions:

1. How many of the Master Car Builders' type (vertical plane) couplers have you in use, and of whose design?
 2. If you have kept any record of the breakage of these couplers, please furnish the committee with a summary of your record.

3. If you have kept a record, give the Committee the results, as near as you can, of your experience and observation concerning the durability of such couplers.

4. If you have any knowledge of accidents which have resulted from the use of the Master Car Builders' type of coupler, please advise the Committee thereof.

5. In the light of your knowledge and experience, would you advise the Master Mechanics' Association to ratify the action of the Master Car Builders' Association in recommending the vertical plane type of coupler as a standard.

Replies should be sent to John Hickey, Master Mechanic, Milwaukee, Lake Shore & Western, Kaukauna, Wis.

Engineers' Club of Kansas City.

A Regular Meeting was held April 14 in the Club Room, President Breithaupt in the chair, K. Allen, Secretary. There were present ten members and one visitor.

E. J. Lawless was elected Associate and Carl Wemtrock, Member.

Mr. Mason stated that the Committee on Affiliation of Engineering Societies would probably present a report at the May meeting.

Col. S. N. Stewart gave a talk on "Drawbridges as Closed by Water Power" and "Water Motors as Used in Europe." Three methods of closing floating draws by the current were described. In the first the current acts on large planks called "fins." In the second a car is pulled up an inclined railroad by a cable, the draw is unlatched and swung open by the current. Fins trailing with the stream when not in use are drawn by a windlass across the stream as the draw is unlatched. The current, acting on these and the draw itself, pulls the car to the top of the incline. When fins are relaxed car descends incline and closes draw. In the third a boat with submerged vanes lies below bridge. A cable from its bow crosses bridge and passes around a pulley on buoy above, returning to draw. When draw is closed vanes are extended. On relaxing vanes, draw swings open by pressure of current, pulling boat up stream. In none of these methods is cable left across draw opening. In the first, speed of closing is limited to velocity of current; the other two can close draw at speed of ten miles per hour, or more, in a two-mile current, if fins are sufficiently large. Examples of river motors were shown.

In a river like the Missouri a motor would yield ten times the power of windmill of same cost and forty times the power of a sun motor. Easily protected from drift, they work in frozen rivers, but with diminished power. The time will come when thousands will be used in such rivers as the Missouri, and will produce results which, if stated now, would seem too fanciful for belief.

Master Car Builders' Association.

The secretary has issued a notice of the twenty-fourth annual convention of the association, which will be held at Old Point Comfort, Va., commencing Tuesday, June 10, at 10 a. m. The headquarters will be at the Hygeia Hotel.

The revision of the Rules of Interchange is the special order of business, at 10 a. m., on Wednesday, June 11.

National Convention of Railroad Commissioners.

At a convention of railroad commissioners held at the City of Washington on the 6th day of March, 1889, a resolution was adopted appointing a committee consisting of the chairman of the Interstate Commerce Commission and three state commissioners to call the next convention, and determine the time and place of holding the same. The undersigned, the committee then appointed, designate the 28th day of May, A. D. 1890, at 11 o'clock a. m. as the time, and the office of the Interstate Commerce Commission, No. 1,317 F street, Sun Building, Washington, D. C., as the place for holding said convention.

The railroad commissioners of all the states, and any state officers charged with the supervision of railroads or railroad interests, and the executive committee of the Association of American Railway Accounting Officers, are respectfully requested to attend the convention.

The undersigned respectfully suggest that among the subjects which may properly be considered by the convention are the following:

I. Railroad Legislation: How to obtain harmony in (Committee appointed by last convention to report at next convention.)

II. Annual Reports from Carriers: Uniformity in, to State Commissions and Interstate Commerce Commission, to what extent desirable. What further steps may be taken for securing greater uniformity.

III. Uniformity in Railroad Accounting: How far it is desirable. How it may be obtained.

IV. Classification of Railroad Statistics: Why should statistics be grouped on the basis of similarity of conditions. What principles should control in making such groupings.

V. Classification of Freight: Should it be uniform in opposite directions. Should it be uniform for the whole country. What should be the unit of classification, e. g., train load, car load, or commercial package. What should be deemed a reasonable difference in the classification of car loads and less than car loads.

VI. Railroad Construction: Should state or federal regulation be provided. What should be the character of such regulation.

VII. State Railroads: Should they be brought under the operation of the federal law. Should subjection of their business to the federal law be made a condition of engaging in interstate business in any form, whether by joint tariffs, through billing of freight or ticketing of passengers, or by accepting traffic for or delivering traffic from their own lines, independently of any business connection with other lines.

VIII. Reasonable Rates: What elements should be considered in determining the reasonableness and justice of a rate. What degree of difference should exist between a joint through rate for a continuous carriage over connecting roads and the local rates of the respective roads. How are rates to be fixed under legislative authority in view of the rulings of the courts that the rate a carrier may lawfully charge is a judicial question.

IX.—Safety appliances for Railroad cars: What legislation, if any, should be had by Congress.

The foregoing are only suggestions offered by the committee, and any other topics affecting state and interstate commerce may properly be entertained and discussed by the convention. A permanent record is expected to be made of the proceedings.

Committee: Thomas M. Cooley, Chairman; George M. Woodruff, of Connecticut; Frank T. Campbell, of Iowa; John M. Mitchell, of New Hampshire.

Northwest Railroad Club.
 The next meeting of the Northwest Railroad Club will be held in the Directors' Room of the St. Paul Union Depot, at 7:30 p. m., Saturday, May 10. Subjects for discussion are: 1 "Driver Brakes," to be introduced by Mr. William McIntosh, of the Chicago & Northwestern.

2 "The Rules of Interchange," to be introduced by C. F. Ward, of the St. Paul & Duluth. This is the last meeting before the summer recess.

Railroad Surgeons.

The third annual convention of the National Association of Railway Surgeons was held in Kansas City, Mo., May 1. Mayor Holmes delivered an address of welcome to which, on behalf of the delegates, President Murdoch responded. Routine reports of committees and secretaries followed. The discussion of medical papers occupied the afternoon session. In the evening a memorial service was held in honor of Dr. J. W. Jackson, late of the Wabash. One hundred and fifty delegates from all parts of the United States and Canada were in attendance.

PERSONAL.

—Col. A. S. Johnson, Land Commissioner and General Tax Commissioner of the Atchison, Topeka & Santa Fe, has resigned after a service of nearly 20 years.

—Mr. Frederick Haskell, for many years President of the Haskell & Barker Car Mfg. Co., of Michigan City, Ind., died in Chicago, May 7, of pneumonia, at the age of 80 years.

—Mr. William R. Baker, formerly President of the Houston & Texas Central road, was stricken with paralysis on Wednesday night, April 30, and died in a short time. He was 72 years of age.

—Mr. Millard Hunsiker has resigned his position as Assistant Secretary and General Agent of the Carbon Iron Co., and has accepted a position in the operating department of Carnegie, Phipps & Co., Limited.

—Mr. George J. Humbert has resigned his position as Superintendent of the Bessemer department of the Chester Rolling Mill Co. to become Superintendent of the Pennsylvania Rolled Steel Car Wheel Co., at Morristown, Pa.

—Mr. H. F. Smith, Assistant General Freight Agent of the Louisville & Nashville, has resigned and has been succeeded by Mr. P. J. McGovern, formerly Division Freight Agent, and more recently Chief Clerk of the Freight Department.

—Mr. Robert Pace, Purchasing Agent of the Western of Alabama, has resigned, to take a position in the purchasing department of the Central of Georgia. He will be succeeded as Purchasing Agent of the Western of Alabama by Mr. T. L. Hewlett.

—Mr. George W. Chellett, Assistant General Freight Agent of southern lines of the Illinois Central road, died in New Orleans recently, after an illness of several months, at the age of 38 years. He was appointed to the position he held at the time of his death, in August, 1886.

—Mr. Stanley Prondit, Second Assistant General Freight Agent of the Chicago, St. Paul, Minneapolis & Omaha, died in Madison, Wis., April 20, after a week's illness. He was 30 years old and had been in the employ of the company since 1881, first as Clerk in the Auditor's office.

—Mr. J. Fairfield Carpenter expects to arrive in the United States about June 1. He writes that he comes to America to stay, and that he will go actively into the brake business. Many of our readers will remember that his new valve was very fully described in these columns last September.

—Mr. George Dole Wadley, formerly Division Superintendent of the Louisville & Nashville and lately General Manager of the Kentucky Union, has been appointed Chief Engineer in charge of the construction of the South Bound road, a line projected to extend from Savannah, Ga., to Columbia, S. C.

—Mr. E. C. Case, General Manager of the St. Louis & Hannibal, and Mr. W. W. Driggs, General Freight and Passenger Agent of the same road, have resigned. George B. Clason, formerly of the Chicago, Milwaukee & St. Paul, has been appointed General Manager, and F. C. Cake, Auditor, has been reinstated.

—Mr. T. W. Burrows, Assistant Superintendent of the New York Central & Hudson River road at Buffalo, has resigned on account of ill health. Mr. Burrows has held the position since last September, being previously Superintendent of the Chicago & Atlantic for a year. He was connected with the Columbus & Cincinnati and its successor, the Cleveland, Columbus, Cincinnati & Indianapolis between 1864 and 1888 as telegraph operator, train dispatcher, train master, Assistant Superintendent and Division Superintendent.

—Mr. Robert E. Pettit, General Superintendent of the Pennsylvania Railroad Division of the Pennsylvania Railroad, has tendered his resignation, to take effect in June. He resigns for the purpose of taking a long vacation, and will start next fall on a tour of the world with his brother, Mr. Henry Pettit, of Philadelphia. He expects to be absent from the country two or three years. Mr. Pettit has been in the service of the Pennsylvania Railroad for 20 years, and has been closely identified with its progress and policy. He is another instance of the influence which scientific men have so long exercised in the organization of that road, having been for many years an active civil engineer. Mr. Pettit was born Nov. 30, 1846, graduated as civil engineer at the Polytechnic College of Philadelphia in 1867, and entered the service of the Philadelphia & Erie with an engineering party in 1868. He remained with

that road on surveys and construction until September, 1872, having located and constructed the Summit Tunnel of the line. From 1872 to 1873 he was employed under the President of the Allegheny Valley Railroad, building the Verona shops and engine houses, and then rebuilt the station and ferry slips and wharves at Jersey City. Since that time he has occupied the following positions on the Pennsylvania road: Assistant Engineer of various divisions, 1874 to 1879; Principal Assistant Engineer Pennsylvania Railroad, July, 1879, to May, 1881; Assistant to Chief Engineer to April, 1882; Superintendent New York division to April, 1885, and General Superintendent Pennsylvania division to June, 1890.

—Major Otho E. Michaelis, Ordnance Corps, U. S. A., died at Augusta, Me., May 2, where he was stationed as Commandant of Kennebec Arsenal. Few officers of the age and rank of Major Michaelis have, in time of peace, become so well known outside of military circles as he was. A man of fine ability, great energy and industry and professional ambition, he had identified himself closely with many business and scientific interests. He was a member of the American Society of Civil Engineers, one of the earliest members and a Vice President of the American Institute of Electrical Engineers, a member of the Engineers' Club and of various other bodies. He had done much valuable expert work in the way of tests, investigations and special reports outside of the strict line of his official duty and was a frequent writer on scientific subjects. His close relation with business and professional men in civil life gave him an uncommon breadth of view and of knowledge. He was graduated from the New York Free Academy in 1862, with the degree of A. B. and afterwards received the degrees of M. A. and M. S. He entered the service as a private, 23d N. Y. N. G. and was commissioned second lieutenant of ordnance, U. S. A., Nov. 24, 1863. He served at Watertown arsenal, Mass., under the late Gen. Rodman, in charge of various shops, building operations, etc., and was subsequently assigned to the ordnance depot at Chattanooga, where he put up storehouses, machinery, shops, etc., on Gen. Thomas' staff as chief of ordnance. In 1865 he was assigned to command of Detroit arsenal, Mich., and was transferred to Watervliet arsenal, Troy, N. Y. Aside from the manufacture of ordnance supplies important engineering operations were carried on during all the time of his assignment; large shops were built, water works were put up, water power applied, etc. He served at various arsenals to the time of his death. He was promoted to be captain June 23, 1873, and major Feb. 28, 1889.

ELECTIONS AND APPOINTMENTS.

Aberdeen & Hoquiam.—J. B. Metcalfe, L. J. Weatherwax, J. S. Kleber, H. B. Lind are the first directors of this company.

Anniston & Montgomery.—The officers of this company are as follows: J. W. Noble, President; William Noble, Vice-President; C. C. Wrenshall, Chief Engineer and Superintendent; E. D. Willett, Counsel, John B. Rees, Secretary and Treasurer, and E. E. G. Roberts, Auditor. The general office is at Anniston, Ala.

Atchison, Topeka & Santa Fe.—H. G. Thompson, Assistant General Ticket Agent of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, has been transferred to be General Passenger and Ticket Agent of the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex.

W. C. Nixon has been appointed Superintendent of the Chicago Division to succeed A. H. Crocker, resigned. John Z. Roarback has been appointed Superintendent of terminals at Kansas City, Mo., to succeed W. C. Nixon.

Atchison, Topeka & Santa Fe in Chicago.—The company held its annual meeting in Chicago, May 5. All the old Directors and officers were re-elected, with the exception of Charles E. Towne, who was succeeded as Director by A. A. Sprague.

Atlanta & Florida R. R.—The title of T. W. Garrett is Superintendent. W. R. Thompson is now Road Master, and G. S. Howdon, Master Mechanic.

Atlantic & Danville.—Stuart Wortley has been appointed Purchasing Agent, with office at Portsmouth, Va.

Baltimore & Eastern Shore.—The annual meeting of the stockholders of the road was held at Easton, Md., May 5. The election of directors resulted in the choice of Joseph B. Seth, Elihu E. Jackson, Theophilus Tunis, James H. Douglass, Thomas B. Taylor, Zora H. Brinsfield, James H. Covey, John E. Marshall, Hiram G. Dudley, John B. Dixon, John J. Thomson, Joseph T. Tunis, Samuel C. Rowland.

Baltimore & Ohio Southwestern.—Frank Brown has been appointed Assistant Purchasing Agent of the road, with office at Cincinnati.

Boston & Maine.—H. W. B. Wightman having resigned his position of Traveling Auditor, the jurisdiction of Edward A. Maxfield, Traveling Auditor, has been extended over the territory formerly under charge of Mr. Wightman. John J. Demeritt has been appointed Assistant Traveling Auditor, with headquarters at Boston.

Brantford, Waterloo & Lake Erie.—W. N. Warburton has been appointed General Freight and Passenger Agent, with headquarters at Brantford, Ont. He was formerly Passenger Agent of the St. Catharines & Niagara Central.

Buffalo, Rochester & Pittsburgh.—At a meeting of the Board of Directors of the company recently, Arthur G. Bates, of Rochester, N. Y., was elected President in place of Adrian Iselin, resigned.

Canada Atlantic.—M. Donaldson has been appointed Superintendent of Transportation, with office at Ottawa, Ont. F. E. Dewey, Train Master, having resigned to accept a position on the Central Vermont, the department of Train Master has been abolished.

Central Vermont.—The office of Traveling Auditor has been abolished. Homer E. Bentley has been appointed Freight Auditor.

Charleston, Sumter & Northern.—W. G. McIntyre, formerly Comptroller, is now Assistant Treasurer. John J. Collier has been appointed Comptroller, with office at No. 45 Broadway, New York.

Chest Creek.—The first Board of Directors of this company is as follows: John Patton, of Curwensfield, Pa., President; Wm. H. Dill, A. W. Lee, James Kerr, Clearfield; A. E. Patton, Charles E. Patton, Anthony Hile, Jr., and C. S. Russell, Curwensfield, Pa.

Chicago, Milwaukee & St. Paul.—The offices of the Assistant General Manager, Traffic Manager and General

Freight Agent have been removed from Milwaukee to Chicago. The passenger department will be removed later. The temporary offices are in the Rookery Building, but the permanent offices will be in the Rand-McNally Building.

Chicago, Rock Island & Pacific.—L. F. Kimball, formerly General Freight Agent of the Minneapolis & St. Louis, has been appointed First Assistant General Freight Agent west of the Missouri River, to have charge of the company's freight business in Colorado, with headquarters in Denver. G. A. Kimball, Assistant General Freight Agent, has been transferred from Denver to the General Freight Agent's office at Topeka.

Chicago, St. Paul & Kansas City.—John L. Pratt has been appointed Assistant Secretary of this company, vice Charles Nicholls, with office at St. Paul.

Chicago, Santa Fe & California.—The annual meeting of the company was held in Chicago, May 5. The only business was the election of officers and the choice of three Directors to fill vacancies caused by expiration of term. The three retiring Directors were re-elected, as were all of the old officers.

Chicago & West Michigan.—The stockholders' meeting was held in Muskegon, Mich., recently. The following directors were chosen: H. H. Hunnewell, C. F. Adams, Charles Merriam, F. H. Damon, G. O. Shattuck, N. Thayer, E. R. Thayer, A. H. Hardy of Boston, and C. H. Heald of Grand Rapids, Mich.

William A. Gavett has been appointed Acting General Passenger Agent, with headquarters at Grand Rapids, Mich. J. F. Reekie will remain in charge of the ticket department. H. P. Dearing having resigned the position of General Baggage Agent, H. T. La Bar has been appointed to succeed him, with office at Grand Rapids, Mich.

F. C. Robinson, Master Mechanic of the Atlantic & Danville, has been appointed Master Mechanic of this road, vice Thomas Butterworth, resigned. His office will be in Grand Rapids, Mich.

Cincinnati, Hamilton & Dayton.—F. A. Husted, Train Master, has been appointed Superintendent of that portion of the road between Indianapolis and Hamilton, with headquarters at Indianapolis, and J. L. Orblison, Superintendent of Telegraph, has been appointed Superintendent of the line between Dayton and Cincinnati, with headquarters at Cincinnati. These sections of the road were formerly operated as one division, under M. S. Connors, resigned. W. H. Gunzleman has been appointed Superintendent of Telegraph.

Colorado Midland.—The annual meeting of the Board of Directors was held in New York City recently, and the following officers were elected: Chairman of the Board, J. B. Rusk, New York City; President, Theodore M. Davis, Newport, R. I.; Vice-President and General Solicitor, Henry T. Rogers, Denver; Secretary and Auditor, E. W. Sells, Colorado Springs; Treasurer, Charles E. Noble, Colorado Springs; General Manager, H. Collbran, Colorado Springs; Chief Engineer, B. H. Bryant, Colorado Springs; Assistant Secretary and Transfer Agent, Oscar Bunke, New York City. Theodore M. Davis, the new President, is a large stockholder, and was at one time Vice-President of the company.

Cumberland, Fort Payne & Atlantic.—The incorporators are: Stephen E. Dobbs, Henry B. Campbell, A. J. McBryde, R. C. Johnston, L. L. Cochran, H. A. Fitzpatrick, William N. Ewing, J. G. Dobbs, L. A. Dobbs, William H. Forney, S. K. McSpadden.

Denison, Sherman & Dallas.—At a meeting of the directors in Denison, Tex., recently, O. H. Osborn, of Fort Scott, Kan., was elected President; R. C. Foster, of Denison, Vice-President, and A. T. Drew, of Denison, Secretary and Treasurer.

Denver & Rio Grande.—W. M. Rank, General Agent at San Francisco, having resigned to manage a local California road, the duties of the position have been divided, and W. H. Snedaker, Passenger Agent at Los Angeles, has been appointed General Western Passenger Agent and C. H. Clarke, Commercial Agent, has been appointed General Western Freight Agent.

Dillsburg & Mechanicsburg.—The election of officers of the company was held at Mechanicsburg, Pa., May 5, and resulted as follows: President, T. B. Kennedy, Chambersburg; W. Penn Lloyd, Mechanicsburg; E. B. Watts and J. Herman Bosler, Carlisle; Henry McCormick, Harrisburg; Joseph Millizee and Christian Bender, Mechanicsburg.

Duluth, South Shore & Atlantic.—G. W. Hibbard, Western Passenger Agent at St. Paul, Minn., having resigned, C. P. Flatley has been appointed General Western Agent, with headquarters at St. Paul.

Eastern of New Hampshire.—At the annual meeting in Portsmouth, N. H., May 7, the following directors were chosen: Moody Currier, Dexter Richards, E. L. Giddings, A. E. Abbott, W. H. Goodwin, F. A. Philbrick and Samuel C. Eastman. The directors elected ex-Gov. Currier, President and W. Hackett, of Portsmouth, Clerk.

Evansville & Indianapolis.—Fred R. Wheeler has been appointed General Baggage Agent, with headquarters at Evansville, Ind. He has also been appointed to fill the same office with the Evansville & Richmond, Evansville & Terre Haute and Evansville Belt roads.

Evansville & Terre Haute.—B. C. Southern has been appointed Master of Transportation of the road, and J. Ehret has been appointed Chief Train Dispatcher.

Fremont, Elkhorn & Missouri Valley.—The following changes have taken place. A. H. Merchant, now General Agent at Sioux City, has been transferred to Omaha, to succeed Henry Cassidy, as Assistant General Freight Agent. H. C. Cheyney, Assistant General Passenger Agent, has been transferred to Sioux City as General Agent of the Sioux City and Pacific.

Goshen & Deckertown.—At the recent annual meeting of the stockholders of the company (New York, Lake Erie & Western, lessor), the following were chosen directors: George W. Murray, Robert Young, L. Wilcox, George S. Vail, George Grier, Chauncey Hulse, A. B. Post, Charles S. Young, Goshen; Stewart Young, Curtis M. Vail, Florida; W. W. Gibbs, Philadelphia, Pa.; John C. Stanton, Deckertown, N. J.; Daniel Bailey, Glenwood, N. J. George W. Murray was chosen President, and Charles S. Young Secretary and Treasurer.

Grand Rapids & Indiana.—J. H. P. Hugbart, Assistant to the President, has been relieved from the charge of the Northern division, Warren B. Stimson, formerly Roadmaster, having been appointed Superintendent, with office in Grand Rapids, Mich. He succeeds the late J. M. Metheny.

Huntington & Big Sandy.—The incorporators of this recently chartered road are: J. L. Caldwell, George F. Miller, Jr., J. C. Miller, G. E. McDonald and Z. T. Vinson, all of Huntington, W. Va.

Iowa Central.—R. A. Dugan is now the Purchasing Agent of this company, with office at Marshalltown, Ia.

Kansas & Arkansas Valley.—A meeting of the stock holders of the railroad was held in Little Rock, and the following officers were elected: George Gould, President; S. H. H. Clark, Vice-President; A. F. Calef, Secretary; Thomas Essex, Assistant Secretary. The following were elected directors: George Gould, Edwin Gould, Logan H. Roots, Thomas Essex, R. S. Hynes, F. R. McKibben and W. H. Shibley. The three last are of Van Buren, Ark.

Kansas City, Fort Scott & Gulf.—H. T. Haines has been appointed Northwestern Passenger Agent of the Memphis system, with headquarters in Kansas City, to succeed H. H. Moies, resigned.

Kentucky Union.—The following appointments have been made: J. L. Murphy to be General Freight Agent and J. F. Babbitt, Jr., to be General Passenger Agent.

Lake Shore & Michigan Southern.—The annual meeting of the company was held in Cleveland, O., May 7, Cornelius Vanderbilt and Darius O. Mills, of New York, William L. Scott, of Erie, Pa., and Rasselas Brown, of Warren, Pa., were re-elected directors for three years.

J. M. Watts, Acting Superintendent of the Toledo division, has been appointed Superintendent of the same division, to succeed Mr. Thomas Flesher, resigned.

W. H. Courtney having resigned the position of Roadmaster of the Buffalo division, Michael Connors has been appointed to fill the vacancy, with headquarters at Erie, Pa.

Louisville, St. Louis & Texas.—The position of Master of Trains has been created, and E. B. Zeigler, formerly chief clerk to the Superintendent, has been appointed to the position, with office at Thirteenth and Churchill streets, Louisville.

Louisville Southern.—The newly elected officers of this company are as follows: Theodore Harris, President; Dennis Long, Vice President; W. R. Woodard, General Manager; William Cornwall, Jr., Secretary; A. H. Ford, Auditor and Treasurer; A. V. Lafayette, General Freight and Passenger Agent; N. B. Patterson, Master of Transportation; H. V. Harris, Purchasing Agent.

Minneapolis & St. Louis.—The following appointments have been made: W. M. Hopkins, General Freight Agent, to succeed L. F. Kimball, resigned; R. G. Brown, Assistant General Freight Agent, with headquarters at Minneapolis, to succeed W. M. Hopkins, promoted; Charles L. Wales, Traveling Freight Agent, with headquarters at Minneapolis, vice R. G. Brown, promoted; Charles S. Tarbox, Commercial Agent at St. Paul, vice M. E. Trumer, General Northwestern Freight Agent, resigned to accept service with another company. The title of J. S. Whitcomb, Contracting Agent of this company at Minneapolis, has been changed to Commercial Agent.

Missouri Pacific.—T. F. Dunaway has been appointed Division Superintendent of the Colorado line, with headquarters at Osawatomie, Kan. O. A. Derby has been appointed Division Superintendent of the Colorado line at Pueblo, Col.

Montana Central.—H. C. Ives, Manager, having resigned to accept service elsewhere, W. B. Green, Assistant Superintendent, has assumed the duties of the position until further notice.

Monterey & Mexican Gulf.—J. M. Trevino has been appointed Paymaster, in place of W. H. Lingard. The title of W. W. Wicks has been changed to Material Agent and General Storekeeper. C. Duncan has been appointed Auditor of Construction Account.

Newport News & Mississippi Valley.—J. B. Lewis, Jr., has been appointed Auditor of the company, vice C. B. Williams, resigned. F. H. Diller has been appointed Car Accountant, vice W. B. Darrow, resigned. S. E. Cheeseman has been appointed Cashier, vice H. F. Given, resigned. S. F. B. Morse has been appointed General Passenger Agent, vice J. L. Murphy, resigned, and C. L. Brown has been appointed General Freight Agent, vice J. L. Murphy, resigned.

New York Central & Hudson River.—O. W. Clough, formerly Roadmaster on the main line between Syracuse and Lyons, has been appointed Assistant to General Roadmaster W. D. Otis. The jurisdiction of M. R. Winfield, Roadmaster from Rochester to Lyons, has been extended over the line between Lyons and Syracuse.

New York, Chicago & St. Louis.—At the annual meeting of the company in Cleveland May 7, William K. Vanderbilt, Cornelius Vanderbilt, Frederick W. Vanderbilt, H. McK. Twombly, John S. Kennedy, and James A. Roosevelt of New York; Charles M. Reed of Erie; Daniel W. Caldwell, Jephtha H. Wade, and Ralph W. Hickox of Cleveland; Frederick P. Olcott and Chauncey M. Depew of New York, and Allyn Cox of Mount Vernon, N. Y., were elected directors for one year.

New York, New Haven & Hartford.—The official announcement has been issued of the appointment of Lucius Tuttle as General Manager, with office at New Haven, Conn. He will have authority over the transportation, traffic, motive power, and car departments. O. M. Shepard having resigned the position of General Superintendent, the duties of that office will be performed by the General Manager. Mr. Shepard has been appointed Superintendent of the New York Division, with office at Grand Central Station, New York.

New York, Ontario & Western.—James R. Dunbar, Eastern Passenger Agent of the Wabash, has been appointed General Eastern Agent of this road, with office in New York City, in place of William M. Abbott, resigned.

Orange County.—Howard G. Pierson, who has held a position in the office of the Auditor of the Lehigh & Hudson River Road Company, has just been appointed Auditor of Traffic of this company, with office at Warwick, N. Y.

Oregon & California.—The annual meeting of the stockholders of the company was recently held in Portland. The old board of directors was re-elected as follows: Leland Stanford, C. P. Huntington, Charles F. Crocker, W. V. Huntington, Timothy Hopkins, R. Koehler, Donald Macleay, John McCracken, R. P. Earhart, W. W. Brotherton, George H. Andrews.

Pacific Short Line.—G. W. Hibbard, General Western Passenger Agent of the Duluth, South Shore & Atlantic, has resigned to accept the position of Traffic Manager of this road, with office at Sioux City, Ia.

Pennsylvania Co.—Bernard Fitzpatrick, General Foreman of the shops at Ft. Wayne, Ind., has been promoted to Master Mechanic of the company's shops on the Cleveland Division.

Pennsylvania, Poughkeepsie & Boston.—Several changes have been recently made in the officers of this road. The list is now as follows: W. W. Gibbs, President, Philadelphia, Pa.; James W. Husted, Vice-President, New York City; Henry H. Kingston, General Manager; M. R. Bockins, Secretary; Joseph R. Sage, Treasurer, Philadelphia, Pa.; T. R. Kennan, Assistant General Manager, Goshen, N. Y.; Charles E. Mack, General Freight and Passenger Agent; E. J. Fallon, Auditor, Philadelphia, Pa.; C. H. Stanton, General Superintendent; W. Gibbs, Purchasing Agent; S. G. Pimrose, Chief Engineer, Goshen, N. Y.

Pittsburgh & Lake Erie.—The title of G. M. Beach is General Superintendent. He succeeds Elliot Holbrook, resigned.

Pittsburgh & Western.—The annual meeting of the company was held in Pittsburgh May 5, and the following board of directors was elected: Henry W. Oliver, President; John W. Chalfant, M. K. Morehead, J. D. Callery, William H. Singer, of Pittsburgh; Thomas S. Spencer, Solon Humphreys and Charles H. Coster, of New York.

Pullman's Palace Car Co.—A. J. Drake has been appointed Assistant Superintendent of Equipment, vice W. H. Fry, appointed Superintendent of Equipment, to succeed J. C. Paul resigned. W. G. C. Wahlers, General Foreman of the Wilmington shops, has been promoted to the position formerly held by Mr. Drake. J. F. Richardson, District Superintendent at St. Louis, has been transferred to Omaha. M. E. Du Bois, Assistant District Superintendent, has been made District Superintendent, vice J. F. Richardson, transferred.

Red Lake & Western.—The first directors of this company are: Judge Frank Ives, of Crookston, President, and H. E. Ives, of St. Hilaire, Secretary and Treasurer. D. A. Brown, W. A. Muertfield and E. O. Myers, of Boston.

Rio Grande & Eagle Pass.—A meeting of the Board of Directors of this company was held in Laredo, Tex., recently, and the following officers were elected: A. B. Wright, Jr., of Philadelphia, President; William Sharp, ex-Receiver, of Laredo, Vice-President and Treasurer; E. A. Atlee, Secretary, and W. L. Giddings, General Manager.

Rio Grande-Midland Route.—P. J. Flynn, lately General Western Freight and Passenger Agent of the Missouri Pacific, has been appointed General Freight and Passenger Agent of this route in charge of through traffic between Ogden and Denver. The route is composed of the Denver & Rio Grande, Rio Grande Western and Colorado Midland.

Sabine & East Texas.—W. S. Hoskins, in addition to his duties as General Freight and Passenger Agent, has also been appointed Superintendent, with office at Beaumont, Tex.

St. Louis & San Francisco.—F. E. Merrill, now Superintendent of the Springfield & Carthage Division, has been appointed General Superintendent, to succeed D. H. Nichols, resigned. He has been in the service of the company about three years and a half, and was formerly with the New York, Pennsylvania & Ohio road. He succeeded Mr. Nichols as Superintendent of Construction.

Seaboard Co.—J. P. Williams, F. M. Farley, H. P. Smart, D. C. Bacon, R. D. Guerard and R. M. Demere, the projectors of the Savannah & Oconee River road, have filed a charter in Georgia for this company, which, among many other projects, proposes to build bridges and railroads.

Shenmut & Brandy Camp.—The incorporators of this Pennsylvania road are: B. E. Cartwright, Ridgway, President; W. N. Sharp, Cartwright, and B. C. Oyster, Ridgway.

Shore Line (Canada).—Hugh B. McLean, Vice-President, has been appointed Managing Director, and Frank J. McPeake, Superintendent, with office at St. John, N. B.

States Island Rapid Transit.—The following directors were elected at the annual meeting last week: Charles F. Mayer, T. M. King, C. K. Lord, W. G. Atkinson, C. J. Ryan and Orland Smith, all of Baltimore; F. S. Gannon, J. F. Emmons, A. B. Boardman, Jas. M. Davis, Chas. Watrous, E. Wiman, and O. S. Wood, of New York.

Tavares & Gulf.—The officers of this company are as follows: Henry H. Jackson, President, New York; Charles Tremain, Vice-President, Oswego, N. Y.; D. G. Ambler, Auditor, Secretary and Treasurer, Jacksonville, Fla.; W. B. Tucker, General Manager; R. B. Foss, Assistant General Freight and Passenger Agent, Orlando, Fla.

Toledo & Western.—At a meeting recently held in Cleveland at the office of Doyle, Scott & Lewis, on Gardner Place, the temporary organization was perfected by the election of the following officers: President, G. G. Hadley; Vice-President, L. S. Baumgardner; Secretary, Elmer White; Treasurer, George H. Ketchum. H. Paul, of Indianapolis, has been appointed Engineer of the road, and has begun the reconnaissance.

Weatherford, Mineral Wells & Northwestern.—L. M. Fouts, Superintendent of the Colorado Division of the Burlington & Missouri road, has been appointed Chief Engineer of this Texas road.

Wilmington & Northern.—The annual meeting of the stockholders of the company was held at Birdsboro, Pa., May 5. The old Board of Directors was re-elected, as follows: Colonel Henry A. Dupont, George Brooke, Dr. Charles Huston, A. L. Forster, John S. Gerhart, William Dupont and Colonel L. Heber Smith.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Aberdeen & Hoquiam.—Organized at Aberdeen, Wash., with a capital stock of \$150,000, to build a road from Aberdeen to Hoquiam, thence along the shores of Gray's Harbor.

Anniston & Montgomery.—Concerning this road, an officer writes that it was chartered by the Alabama Legislature in 1889 to extend from Anniston to Montgomery, through the counties of Clay, Coosa and Elmore, centrally, and touching Clemon, Talladega and Tallapoosa counties. The route is through the towns of Oxford, Ashland, Millerville, Kellyton, Center Institute and Wetumpka. The road will open the country lying be-

tween the Coosa and Tallapoosa rivers, and furnish railroad facilities to a tributary population of 60,000 people, who now have little rail communication. It will give a direct route from north Alabama to the central portion of the state. The line as located is 109 miles long, as against the present route (via East Tennessee, Virginia & Georgia to Calera, and via the Louisville & Nashville from Calera to Montgomery) of 136 miles. The route located passes through a good timber, iron ore and limestone section on its northern end, and through a fine planting and farming section its entire length, except 15 miles of mountainous region near Blue Ridge mountains. The general grade of the road is 52.8 ft. per mile, and general limit of curvature is six degrees; but through the mountains the engineers have used 66 ft. per mile, and eight degree curves, as the maximum. The general line averages 19,981 cubic yards per mile, and 53,000 ft. timber per mile, with five spans of iron bridging. There are no tunnels and no heavy cuts. The right of way has been almost entirely secured, including station grounds and other terminal facilities. The company proposes to issue bonds at the rate of \$20,000 per mile; these have not yet been placed, but negotiations to that end have been in progress for some time. If successful, construction work will then be begun. John W. Noble is President, and C. C. Wrenshall is Chief Engineer, both of Anniston, Ala.

Baltimore Belt.—The City Council of Baltimore, Md., has granted the franchises asked for by the company for building through certain streets in the city and constructing an open cut along one of the avenues. The mayor's signature is now only needed to make it a law.

Baltimore & Eastern Shore.—The tracklaying has been completed south of Easton to Preston, Caroline County, and is progressing rapidly south of that point. It is expected to open it between Eastern Bay and Easton, 17 miles, by June 1, and to Salisbury on the Pennsylvania, 40 miles southeast of Easton, by July 15. The section between Salisbury and Ocean City, 30 is in operation. An 11-mile ferry connection across Chesapeake Bay will be made with the Annapolis & Baltimore Short Line. The transfer boat for this service and the terminals on the western side of the bay will soon be finished.

Blackville, Alston & Newberry.—The survey has been made for the proposed extension from Sievern to Batesburg, in Lexington County, S. C.

Briarfield, Blocton & Birmingham.—Aldrich Worthington & Co., of Birmingham, have sublet the contract for grading the Bessemer branch between Gurnee and Bessemer, Ala., 20 miles. A large force is now working north from Gurnee, and about a mile of grading has been completed from that point.

California Coast Line.—A company is being organized in California under this name, with the avowed object of building a road from Portland, Or., south along the Pacific coast through California. Albert Houghton, of San Francisco, director.

Chest Creek.—The charter of this company was filed in Pennsylvania last week. It is to extend from a point on the line of the Clearfield & Cambria road at Westover, Pa., to a point in Cambria County, near Carrolltown. The distance is 10 miles. The capital stock is \$100,000. John Patton, of Curwensville, is President.

Chicago & Eastern Illinois.—The company is reported to have engineers in the field surveying from Tascala to Sullivan, Ill., for an extension of the St. Louis branch to Sullivan, to connect with the Peoria, Decatur & Evansville.

Chicago, Rock Island & Pacific.—The company has two parties of engineers surveying between Omaha and Ashland, Neb., but no portion of line located, "except by newspapers," as an officer states. It is doubtful if the company will build any extension this season other than this line from Omaha to Lincoln, and this has not yet been decided.

Chicago, St. Paul & Kansas City.—A press dispatch states that negotiations are in progress for the placing of an issue of bonds, the proceeds of which are to be used in building a number of branches. The first line is from Peru, Iowa, to Omaha, giving the company a line from Chicago to Omaha about 493 miles long. The second line is from Savanna, 12 miles northeast of St. Joseph, to Omaha, through southeastern Iowa. The third is a short branch from Sheridan, half way between Peru and Savanna, west to Tarkio, which is about half way between Savanna and Omaha.

Cleveland, Cincinnati, Chicago & St. Louis.—It is stated that the company will probably extend the Whitewater road six miles to a connection with the Ohio, Indiana & Western, now the Peoria division.

Corsicana & Southeastern.—The capital stock of \$200,000 has been subscribed, and the location is now in progress. The road is to be built from Corsicana, Tex., southeast to Keechi or Buffalo, on the International & Great Northern, about 50 miles.

Cumberland, Fort Payne & Atlantic.—The company has been incorporated in Alabama to build a road from a point on the Alabama and Tennessee State line near Bridgeport via Bridgeport in Jackson County, Fort Payne in De Kalb County, Centre in Cherokee County, Piedmont in Calhoun County, to a point on the Alabama and Georgia line near Tallapoosa, Ga. The capital stock is fixed at \$1,000,000.

Denver & Rio Grande.—The annual meeting will be held in Denver, May 27. The stockholders will be asked to authorize the Directors to construct the proposed extension from Villa Grove to Alamosa, a distance of about 50 miles, and also such branches as the Directors may determine from any points on the lines of the company to coal and other mines or quarries, of a total of about 21 miles, and issue from time to time \$1,552,500 of its first consolidated mortgage four per cent. bonds, at the rate of \$20,000 per mile of such new construction.

Denver, Texas & Fort Worth.—The company is to change its line between Parker and Elizabeth, Colo., 16 miles, in order to avoid the heavy grades at Plainfield and Hill Top. Several preliminary surveys have been made from Parker up Cherry Creek and via the gulch to Elizabeth, but the route has not been decided on, though the latter, about 20 miles long, will probably be adopted.

Duluth & Winnipeg.—The directors have authorized the increase of the capital stock of the company to \$2,000,000. It is reported that it is the intention to resume work on the extension north in a short time. Passenger trains will begin running May 15 between Duluth and Laprarie. The track of the St. Paul & Duluth will be used between Duluth and Cloquet.

Findlay Belt.—It is announced that a new survey will begin at once for this belt line at Findlay, O., to definitely establish the route about the city.

Geneva & Van Ettenville.—The New York State Board of Railroad Commissioners have granted the application of the company for permission to increase its capital stock from \$800,000 to \$4,000,000; \$1,200,000 of this increase of stock will be needed to make an exchange for the stock of the Geneva & Sayre road, and \$1,200,000 for an exchange for stock of the Auburn & Ithaca road, both of which the Geneva & Van Ettenville intends to consolidate and operate. The balance of the increase of stock will be required for the construction of the Geneva & Van Ettenville road from Geneva to Van Ettenville, N. Y., 56 miles, and the double-tracking of the Geneva & Sayre.

Grafton & Upton.—An agreement has been made by this company with the New York & New England concerning the crossing of the tracks of the latter at Milford, Mass., by the extension of the former line, and the suits in relation to the matter are to be withdrawn. The New York & New England is to be compensated for the injury it sustains by the crossing. Trains will probably be running by May 12 on the extension between Grafton and Milford, eight miles.

Gunterville, Fort Payne & Port Royal.—A company was organized at Fort Payne, Ala., last week to build this road from Fort Payne east toward Port Royal.

Interoceanic.—Construction work on Hampson & Sullivan's contract between Las Vegas and Vera Cruz is going rapidly forward. Already 16 miles west from Vera Cruz has been completed and tracklaying is being pushed at the rate of a kilometre a day. The distance between these two points is 117 miles. The tracklaying is also in progress east from Las Vegas, and a junction will be effected with the eastern end between Jalapa and Rinconada. The contractors have signed a contract with Delin Sanchez for the construction of about 12 miles of roadbed between Matamoros de Izucar and Chiantla.

Kentucky Roads.—Bills have been introduced into the State Legislature to incorporate the following roads: Hardinsburg & Cecelia, Louisville, St. Louis & Nashville, Louisa & Eastern, Altamont & Manchester, Leitchfield, Big Spring & Northern, Lexington & Richmond and the Owensboro Belt Line Railway & Transfer Co. Bills previously introduced to incorporate the following roads have become laws: Salyersville, Prestonsville & Norfolk, Prestonsville & Southern, Corydon & Princeton, Three Forks Belt Line, Kentucky River & Virginia, Elkhorn & Pineville, Louisville, Mt. Sterling & Norfolk, Lebanon & North & South, Sacramento & Central City, Belt Railroad Co. of Owensboro, Princeton Belt, Turner Station, Drennant Springs & Owenton, and the Waco & Richmond.

Lancaster & Hamden.—Construction work is now in progress on this road, which is being built by E. P. Buell & Co., of Tarlton, O. The road is projected to extend from Columbus to Point Pleasant, on the Ohio River, a distance of 116 miles, of which a 50-mile section is ready for tracklaying. On 14 miles 65 lb. rails have been laid. The grading and tracklaying is being pushed from Ash Cave, 55 miles southeast of Columbus. One branch is to be built 25 miles to Welston, and one branch 25 miles to Floodwood. Both main line and branches extend through the rich coal and iron and oil fields, from which a heavy traffic is expected to the northwest via the new Columbus, Lima & Milwaukee, now under construction. The lines are under contract to be completed this year. They will make a route from the Ohio River to Saugatuck, Mich., 355 miles long.

Macon & Atlantic.—The Macon & Savannah Construction Co. has been organized to build this road between Macon and Savannah, Ga., or Port Royal, S. C. The capital stock is \$1,000,000, and of this \$500,000 has been subscribed by the Macon Construction Co. In addition to this \$70,000 has been subscribed in Macon, Ga.; \$50,000 in Savannah, with an option on \$60,000 more, and \$320,000 in New York. The engineering corps is being organized, and will begin the survey about June 1. W. B. Sparks will be President of the new company; Jefferson Lane, General Manager, and H. L. Jewett, Secretary and Treasurer, all of Macon.

Maine Central.—A bill has passed the Dominion Parliament, enabling the Maine Central to lease the Hereford road, in Quebec Province. The Hereford is the Quebec division of the Upper Coos road, which it is understood the Maine Central has leased. The line extends from North Stratford north to a connection with the Quebec Central, and is about 77 miles long. The Maine Central is to build a line about 33 miles long from Lunenburg to North Stratford, to connect with the Upper Coos road.

McDonough & Doraville.—A charter is being prepared for this road, to extend from McDonough, in Henry County, to Doraville, in De Kalb, connecting the Georgia Midland & Gulf with the Richmond & Danville. The capital stock is \$100,000, with privilege to increase to \$500,000.

Mexican Roads.—The Department of Public Works has authorized Agustin Arriaga to build a standard-gauge road from Villa de Vieja, in the State of Coahuila, to Villa de San Pedro, on the Mexican Central, between Torreon and Lerdo. Surveys must begin at once, and construction within six months. The grades are not to exceed four per cent. At the expiration of 99 years the line is to pass to the nation, the government being obliged to buy all rolling stock, stations, workshops, etc.

Michigan Central.—McRae, Lally & Co., of Detroit, have the contract for the double-tracking of this road between Canfield and Welland, Ont., 16 miles.

Milwaukee & Northern.—McIntosh Bros., of Milwaukee, Wis., have been awarded the contract for building a road in the interests of this company from Iron Mountain to Escanaba, Wis., 54 miles. It is to develop the iron mines in the Menominee range, controlled by the Schlesinger syndicate.

Missouri Pacific.—Grading and tracklaying have been completed on the Houston, Central Arkansas & Northern, between Dermott, Ark., on the St. Louis, Iron Mountain & Southern, and Mer Rouge, La., for a distance of 60 miles.

Monterey & Mexican Gulf.—A statement concerning the progress of this road has been issued recently. It states that the company, by the concession from the government, secured \$8,000 per kilometre, or \$14,500 per mile, in six per cent. silver bonds. The terms of the con-

cession required the construction annually of 40 miles of road, but while the first shipment of rails was made in February, 1889, 160 miles of road were in operation last month. The road is of standard gauge, and is equipped with 56 lb. rails. The only lien on the property is a mortgage to the Central Trust Co. of New York, to secure the first mortgage five per cent. gold bonds at the rate of \$25,000 per mile. The subsidy bonds were sold through J. & W. Seligman, of New York, but the first mortgage bonds and stock are still held by the original owners. Work was begun from Monterey southward, and the completed portion of the road extends 91 miles south and 61 miles north of that city. The southern section has for some time been earning \$700 a day, and it is expected that the northern section, between Venadito and Monterey, will increase the earnings to \$1,500 a day. The number of men now at work on the road is 4,000, and the line will probably be completed to the Gulf within a year. From Monterey to Linares, the present southern terminus of the completed road, the location is through the centre of a wide valley, bounded on the east by the San Carlos and on the west by the Sierra Madre Mountains. The maximum grade does not exceed 1½ per cent., and the curvature is easy. There is little rock ballast, gravel and tepetate being used instead.

New Roads.—A temporary organization has been made of a company which proposes to build a road from Huntsville southwest through Anderson, Navasota, and Brenham, to La Grange, a distance of 113 miles. The organization will be completed when subscriptions to the capital stock amounting to \$125,000 have been made. Among those interested are: T. H. Ball, of Huntsville; H. H. Boone, of Navasota, and W. E. Barry, of La Grange.

The Board of Trade of Monte Vista, Colo., is obtaining subscriptions for a proposed line from Monte Vista south a short distance.

A survey was commenced May 1 for a line from Milton Mills through North Shapleigh to a point of the White Mountain division of the Grand Trunk. Another proposed route is from North Berwick or South Berwick, Me., through Sanford, Springvale, Acton and North Shapleigh to Cornish, on the Maine Central.

Right of way is being obtained for a line along the Bolivar peninsula from Galveston, Tex., to the Texas pine regions.

New York, Fort Wayne & Chicago.—The company has been granted articles of incorporation in Ohio to construct a road from the east boundary of the state in Mahoning County, westerly through the counties of Mahoning, Portage, Summit, Medina, Ashland, Huron, Seneca, Hancock, Putnam and Paulding. The capital stock is \$50,000, and the incorporators are C. B. Matthews, F. H. Baldwin, John Carlisle, Drausin Wulson and Joseph B. Foraker.

New York & New England.—In the Massachusetts Senate the Railroad Committee has favorably reported a bill to authorize the Rhode Island & Massachusetts to issue \$1,500,000 five per cent. 50-year mortgage bonds for the purpose of double tracking the road from Franklin to Valley Falls, and extending the line into Providence. The New York & New England is to guarantee the bonds. A similar bill has passed the Rhode Island Legislature.

Ohio Valley.—The contracts for building this road from Bellaire to Powhatan, O., sixteen miles, have been let, exclusive of bridges, at a total cost of \$150,000 to Serpell & Morris, of Louisville; the J. C. Gibney Co., of Indianapolis; J. T. Hart, of Marietta; Miller & Stoehr, of Steubenville, O.

Ontario, Carbondale & Scranton.—About 25 miles of track has been laid, and the work is now in progress at the rate of a mile a day. The tracklaying has been completed to a point five miles north of Herrick and for 17 miles north of Carbondale, Pa., and of this latter section 10 miles has been ballasted. The line will be ready for operation between Scranton, Pa., and Hancock, N. Y., in June.

Pacific Short Line.—The tracklaying has been completed for over 20 miles from Sioux City through Dakota County, to near Randolph, Dixon County. It is stated the contractors are progressing with the work at the rate of over two miles a day.

Pajara & Valley.—Contracts will be awarded this week for building this narrow gauge line from Watsonville, Cal., through the counties of Santa Cruz and Monterey to Moss Landing, in the latter county, a distance of 12 miles. The road is to be built by the Western Beet Sugar Co. W. C. Waters, of Watsonville, is Superintendent.

Peru & Detroit.—Contracts for building the road, which is to connect the two Wabash lines at Peru, Ind., have been let, and work will be begun within ten days and completed by August 1.

Red Lake & Western.—Articles of incorporation have been filed in Minnesota for this road, which is to extend from a point on Red Lake and run west to St. Hilaire. The capital stock is \$50,000.

Roseburg & Coos Bay.—The preliminary survey of the road has been completed from Roseburg via Myrtle Point to the terminus at Coos Bay, Ore., 90 miles. Coos, Curry and Douglas counties have been asked to raise a subsidy of \$150,000, of which \$75,000 has been subscribed.

St. Joseph, Tarkio & Northwestern.—This company has been organized to build a branch of the Chicago, St. Paul & Kansas City road from St. Joseph or Savannah to Tarkio, Mo. It is stated that most of the right of way has already been guaranteed. David Rankin, of Tarkio, is President.

St. Louis, Alton & Springfield.—The General Manager denies the reported sale of the road, but states that a financial arrangement has been completed by means of which the company will be able to float its bonded indebtedness and complete the northern extension from Bates into Springfield, Ill., and from Alton to Venice on the south, and enter St. Louis over the new Merchants' bridge. It is understood that an agreement giving the Illinois Central track rights has been made.

St. Sebastian Sugar Valley.—Incorporated in Florida to build a road in Brevard County about 24 miles long, to be operated in connection with the St. Johns and Sebastian canal. The capital stock is \$100,000.

San Antonio & Aransas Pass.—The Waco extension has been completed to a point north of Lexington and 15 miles south of Rockdale, Tex., but has been prevented from continuing work, as the International & Great Northern has obtained an injunction preventing the crossing of its track.

Santa Eulalia.—Four hundred men are reported at work on this road between the Santa Eulalia mines, in Mexico, and the reduction works, 15 miles distant.

Seattle, Lake Shore & Eastern.—The northern branch of the road is now completed within seven miles of the Stillaguamish River, a point 18 miles north of Snohomish, Wash., and 1,000 men are employed upon that section of the road. The grading forces are 10 miles north of Blackman Station, near which they are working on a 30-ft. cut. The track is laid and nearly ballasted to this point.

Shawmut & Brandy Camp.—This company has been chartered in Pennsylvania to build a road from a point on the Meade & Laurel Run Road northeast of Shawmut, Elk County, to a point in Heston Township known as Chestnut Hill, on the Ridgway & Brookville road. The length of the proposed line is 2½ miles. The capital stock is \$25,000. B. E. Cartwright, Ridgway, is President.

Sonora, Sinaloa & Chihuahua.—The construction company, which is building this road, and which has headquarters at Lima, O., claims that \$21,650,000 has been subscribed in England to complete the road from Deming, N. M., to Topolobampo Bay, on the Pacific Coast, in Mexico. The system will include three lines, the Deming, Sierra Madre & Pacific; the Sonora, Sinaloa & Chihuahua, and the Chihuahua & Sierra Madre, which together will be about 1,500 miles long. The road will connect at Deming with the Southern Pacific and Atchison, Topeka & Santa Fe systems, and in Mexico with the systems of that country. Surveys have already been made, 180 miles of roadbed have been graded, terminals and three miles of deep water-front have been bought at Topolobampo Bay, and trains will be running on the first section from Deming in a short time. George H. Sisson, 2 East Fifteenth street, New York City, is President.

Springfield & Hillsboro.—The survey of this proposed road was commenced April 29 at a point about seven miles south of Hillsboro, Ill., on the Toledo & Kansas City road. The company was recently incorporated to build a road from Springfield through Rochester and Hillsboro to Donnellson, Ill., 59 miles. J. M. Stark is President, and J. E. Burtis is Chief Engineer, both of Pawnee, Ill.

Toledo, Ann Arbor & North Michigan.—Active construction work will soon be commenced on the Chippewa Valley extension from Mount Pleasant to Manistee, on Lake Michigan, 117 miles. Of this 37 miles is completed. This is the narrow gauge Manistee & Luther which is now being changed to standard gauge. It is intended to complete the entire road this year. An issue of \$1,800,000 five per cent. bonds has been authorized, of which \$700,000 has been issued on the completed portion.

United States Central.—A directors' meeting was held in Palmer, Mass., last week, at which it is stated that arrangements were made for building the first 12 miles of the 65 between Worcester, Mass., and Hartford, Conn. This road has been proposed for several years, but its projectors have not succeeded in interesting in it many persons of financial ability.

Wallace & Sunset.—This company has been organized at Wallace, Idaho, with a capital stock of \$500,000, by Patrick Clark, George W. Dickenson, Charles S. Warren, Cary D. Porter and John A. Finch.

Wardner Mining Railroad Co.—Articles of incorporation have been filed in Idaho by this company, which proposes to build a road from a point at or near Wardner Junction, in Shoshone County, southwest to the mines south of the town. The estimated length of the road and branches is 15 miles. The principal place is Wardner. The capital stock is \$300,000.

Wheeling & Lake Erie.—It is stated that this company has decided to build a line from Creston, O., or a point near there, to Cleveland, a distance of about 40 miles. The extension is estimated to cost \$1,200,000. When built it is to be used jointly by the New York, Pennsylvania & Ohio, and in consideration for this arrangement the line is to be allowed to use the Cleveland terminals of the New York, Pennsylvania & Ohio, entering the city over its tracks, the connection being made a short distance outside the city limits.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals) and net earnings of the road for the month of March, 1890, were as follows:

	Gross Earn.	Oper. Exp.	Net Earn.	Oper. Mile.
Rds owned and controlled.	\$2,491,378	\$1,639,715	\$851,663	6,528
Rds jointly owned with other companies, Atchison Co's one-half.	133,764	113,067	20,697	582
Total.	\$2,625,142	\$1,752,782	\$872,360	7,110

The comparative statement of all lines is as below:

	Gross earn.	Net earn.	Gross earn.	Net earn.	Mileage
March, 1890.	\$2,625,142	\$872,360	\$300	\$123	7,110
March, 1889.	1,951,872	353,502	270	50	7,115
Inc. Mch. 1890.	\$673,270	\$518,858	\$30	\$73	dec. 5

Cairo & Kanawha.—A mortgage for \$75,000 has been recorded in West Virginia on the line extending from Cairo to the Ritchie Mines, thence down McFarland to the Staunton pike road.

Canadian Pacific.—The company proposes to guarantee \$20,000,000 four per cent. bonds on the Duluth, South Shore & Atlantic and the Marquette, Houghton & Ontonagon roads, and to guarantee the bonds. They will retire all the bonds and stock of the latter road, leaving only the Duluth, South Shore & Atlantic five per cent. bonds ahead of the four. They will use the additional money in betterments and some new mileage in the way of branches. The \$1,500,000 Marquette, Houghton & Ontonagon sixes of 1923 may be called at 105, and the \$576,200 sixes of 1908 may be paid at par from the proceeds of land sales.

Chesapeake & Ohio.—The report of the earnings for March is as follows:

	1890.	1889.	Inc.
Mileage.	915	754	261
Gross earnings.	\$571,000	\$430,000	\$141,000
Oper. expenses.	470,000	368,000	102,000
Net earnings.	\$101,000	\$72,000	\$29,000
Net July 1 to March 31.	1,418,606	854,206	564,400

Chicago & Atlantic.—The difficulties in the way of the reorganization of the road are said to have been practically overcome. A settlement has been made with the dissenting second mortgage bondholders, and their suit has been withdrawn. The road will be sold under foreclosure and bought in the interest of the New York, Lake Erie & Western.

Chicago & West Michigan.—The annual report of the company for the year gives mileage 408; gross earnings, \$1,324,833; operating expenses, \$1,018,465; net earnings, \$306,367; other income, \$6,945; net earnings available for dividends, \$125,466; decrease, \$14,433; balance to the credit of income after payment of dividend Feb. 15, 1890, \$174,596. Of the five per cent. mortgage bonds of the company \$676,000 were issued during the year, and the proceeds were used in retiring \$480,000 Chicago & Michigan Lake Shore Railroad Co. first mortgage eight per cent. bonds, due Sept. 1, 1889, and for account of construction.

Columbus & Maysville.—This road was sold at Columbus, O., May 5, by order of the United States Court. The suit was brought by the Central Trust Co. of New York to secure the payment of \$200,000 in bonds issued by the road. The road has 19 miles in operation between Hillsboro and Sardinia, and has graded other portions of the line. The property was sold to E. F. Hyde, J. H. Barker and William Parkin, trustees for the bondholders, for the sum of \$50,000. This is the second time the road has been sold. It will probably become a part of the Ohio & Northwestern, which now operates it.

Columbus, Springfield & Cincinnati.—It is stated that the Cincinnati, Sandusky & Cleveland will surrender the lease of this road on June 1, and that the line will then be purchased and operated by the Cleveland, Cincinnati, Chicago & St. Louis, as may also the Cincinnati, Sandusky & Cleveland. The likelihood of this action is disputed, as it is claimed that the necessary number of directors to effect the change are not in favor of the movement. The road extends from Columbus to Springfield, Ohio, 44 miles.

Lake Shore & Michigan Southern.—The annual report for the year to Dec. 31, 1889, has been issued. It shows that the earnings and expenses were as follows:

	1889.	1888.
Gross Earnings.	\$12,545,810	\$11,620,174
From freight.	5,082,480	4,810,147
From passengers.	1,122,340	852,389
From mails.	416,798	415,164
From express.	319,768	322,753
All other sources.		
Total earnings.	\$19,487,197	\$18,020,627
Operating expenses and taxes.	12,847,452	11,310,371
Net earnings.	\$6,639,745	\$6,710,256

The gross earnings last year were the largest in the history of the company. All betterments during the past six years have been charged to operating expenses or income account. The funded debt was reduced in 1889 from \$45,192,000 to \$44,942,000 by the purchase and cancellation for the sinking fund of \$250,000 in first consolidated mortgage bonds. The total assets of the company on Dec. 31, 1889, were \$100,921,238, an increase over the previous year of \$537,000; the total liabilities were \$98,528,485, a decrease of \$205,251. The number of tons of freight moved in 1889 was the largest in the history of the company, being 10,020,500 tons, against 9,009,857 tons, an increase of 10.48 per cent. The passenger business for the same period was also the largest in the company's history, both in number of passengers carried, 4,413,592, and the earnings, \$5,082,480. The reduction of grades on the Sandusky Division will be completed this year, thus finishing that work between Cleveland and Chicago. Similar work has been commenced on the Buffalo Division.

Manitoba & Northwestern.—The company has concluded the sale of its entire Dominion land grant, consisting of 400,000 acres, for about \$2 an acre, to a syndicate of English and Scotch capitalists. A company has been formed under the name of the Manitoba & Northwestern Land Corporation, which proposes to divide the land into small homesteads, and loan settlers \$500 in cash.

Mexican Central.—The annual report was issued this week. It states that since the last annual meeting about 200 miles of new road have been constructed, and the entire Tampico line, from the main line to the Gulf of Mexico, has been completed and is ready for traffic. This line, from the junction with the main line near Aguascalientes to Tampico, is 400 miles in length, and its greatest importance is in forming an outlet from the interior of the Republic of Mexico to the Atlantic Ocean. The work of deepening the harbor will be pushed as rapidly as practicable, and the engineers and contractors expect to secure a depth of at least 16 ft. of navigable water through the bar before the close of the present year. It is expected that a depth of 24 ft. of navigable water will be obtained and the jetties substantially completed before March 1, 1892. The present completed mileage of the company is 1,825 miles. The gross earnings for 1889, in Mexican currency, were \$6,357,225, an increase of \$567,980; the operating expenses, \$3,511,826, an increase of \$92,880; and the net earnings, \$2,845,398, an increase of \$469,905. Included in the earnings are \$455,451 freight on construction material. The company's income from all sources in the year 1889, available for interest, was, in United States currency, \$2,931,510. The payments for taxes, premium and interest were \$2,145,524, and there is a surplus of \$785,986. The subsidy receipts during the year amounted in United States currency to \$812,911. On July 1, 1890, the subsidy collections will be at the rate of eight per cent. of the customs revenues, instead of seven per cent.

New London & Northern.—The State Senate of Massachusetts has passed the bill authorizing the New London & Northern to lease its road to the Consolidated Railroad of Vermont.

Oregon.—This company has been organized to succeed the Oregonian, which has been purchased by the Southern Pacific. The capital stock is \$3,000,000. The charter provides for lines from Portland through the Willamette Valley via Silverton and Springfield, Lane County, to the boundary line between Oregon and California, and also from Portland, on the west side of the Willamette River, to Airline, Polk County.

Oregon & Transcontinental.—A syndicate has been formed to retire the first mortgage collateral trust bonds of the company. The bondholders have the option of accepting new Northern Pacific general mortgage five per cent. bonds at a price not yet fixed, or of taking cash at 105 and accrued interest. The objects of the retirement are a reduction of the interest

charges and the facilitation of the reorganization. The interest on the present bonds is six per cent., and there is a sinking fund attachment of one per cent. The total bond issue is \$9,413,000, but with the sinking fund \$10,063,000 has to be provided for. These bonds are secured by other bonds of branch roads, and under their terms cannot be redeemed at less than 105 and interest.

The report that the capital stock of the company is to be greatly reduced is entirely without foundation. Just what will be done with the new company has not yet been determined. It is stated that it will be a large financial and, possibly, construction company. Should the Northern Pacific, it is explained, desire to construct additional branches, the Oregon & Transcontinental Co. might take the contract. The present holders of Oregon & Transcontinental stock will probably receive stock of the new company, or securities of the Northern Pacific.

Pennsylvania.—The directors have voted an extra dividend of one-half of one per cent., payable May 29, making three per cent. for the half year. They have also made an allotment of stock to present stockholders at par of eight per cent. of their present holdings. The present capital stock is \$113,488,000, and the stock allotment will add about \$9,079,088 to this amount, making a total of about \$122,567,088. President Roberts estimates that the needs of the company and its affiliated companies for the present year will be \$11,500,000. Of this sum \$4,000,000 is to be spent for third and fourth tracks, sidings and terminal facilities; \$1,500,000 for real estate, \$2,000,000 for locomotives and cars, and \$4,000,000 for construction work on additional branch lines. This estimate is for the entire system, and a portion of the amount will be provided by the auxiliary lines to be benefited by the improvements. Only \$9,000,000 will be spent on the Pennsylvania road proper. With the new money raised by the allotment the elevated road at Jersey City will be built, the laying of third and fourth tracks on the New York division completed, and additional tracks and sidings laid on the main line. The appropriation for new construction will be largely devoted toward the completion of the 50-mile cut-off between Downingtown and Trenton.

Philadelphia & Reading.—The company has obtained control of a plot of ground at the foot of Grand street, in Brooklyn, N. Y., which it will convert into a freight yard capable of accommodating seventy-five cars and equipped with derricks. Freight will be moved to and from Jersey City by means of floats. Grand street is near the sugar refineries, whence the trunk lines take very large shipments.

Rutland.—Dispatches in Eastern newspapers the past week have reported the signing of the lease of this road by the Delaware & Hudson Canal Co., to take effect Dec. 30, 1890, on the expiration of the present lease to the Central Vermont. But nothing is published in these dispatches that was not known over a year ago. One paper, however, states that, under the terms of the lease the Delaware & Hudson guarantees to pay operating expenses and the interest on the entire funded debt of the road, also to pay up to four per cent. on the preferred stock, and any excess in net earnings over the amount required to pay four per cent. will be divided between the lessor and the lessee. The Delaware & Hudson will issue \$5,000,000 new Rutland consolidated four per cent. bonds, principal and interest guaranteed by the Delaware & Hudson, to be used in taking up the mortgage for \$3,000,000 on the Rutland and for improvements, equipment and possible extensions. The Delaware & Hudson owns \$3,000,000 of the preferred and \$1,000,000 of the common stock.

Shenandoah Valley.—In the City Circuit Court at Roanoke, Va., the case of the Fidelity Insurance Trust & Safe Deposit Co., of Philadelphia, against the company, which has been pending five years, a decree has been entered directing the sale of the road to satisfy all claims, including interest to July 1, 1890. The claim of the general mortgage bondholders for \$1,560,000 of first mortgage bonds deposited with the Fidelity Co. as collateral security for general mortgage bonds, although resisted by counsel, was sustained, as was that of the Central Improvement Co., of West Virginia, for \$771,338.

Southern Pacific Co.—The annual report for the year ending Dec. 31, 1889, shows the earnings of railroads and steamships, leased and proprietary, to be \$46,343,207, and the operating expenses \$30,304,355. The through passenger earnings decreased \$474,808. This was entirely in west-bound business, which shows a decrease of 24 per cent. in revenue. The principal cause of this decrease in earnings is the falling off in traffic from the east to southern California, which was very large the previous year. Freight earnings show a total decrease of \$1,489,077.

Toledo, Ann Arbor & North Michigan.—The company proposes to abandon the branch between Lelands and South Lyon, Mich., 5½ miles, as it has never paid operating expenses. The petition of the company for permission to abandon the line is opposed by the residents of South Lyon, as the company received a subscription of \$50,000 for building the branch.

Utica & Black River.—The stockholders have approved a mortgage on the company's property to secure the payment of \$2,000,000 of bonds to be issued.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, May 7, 1890.
All indications point to the conclusion that the Western lines have decided to end the present rate demoralization and prepare the way for some new form of association control as speedily as possible. That there are many obstacles yet to be overcome is apparent, but that there is an earnest desire on the part of all lines to overcome them if possible is also clear.

The most important meeting of the week was the conference of the Presidents of the various lines, which convened Monday forenoon and is still in session. No definite plan has been decided upon. The attendance was practically complete, all the roads either being represented or having communicated their position to the meeting. A general disposition was manifested to devise some plan for the restoration of rates, the difficulty to be faced being the methods which may properly be pursued to that end. The question of the division of competitive traffic is the one which the lines generally concede must be settled in some way, but no measure to effect the desired result was presented that secured the necessary consent of all the lines. The following resolution was adopted:

That the managing officers of the traffic departments of these companies shall convene here on the 8th inst.,

for the purpose of forming one or more organizations to govern the freight traffic which is covered by the Western Freight Association (Western, Northwestern and Southwestern divisions) and the Trans-Missouri Freight Association, and such other business as it may be deemed necessary to include, and for the further purpose of arranging at the earliest possible date for the restoration of freight rates as nearly as can be agreed upon to the figures which were in effect on Dec. 31, 1889.

The general passenger and ticket agents of the lines in the territory of the Western States and Trans-Missouri Passenger Associations met yesterday, pursuant to adjournment. They are still in session. They agree well enough on details, but no motion to advance rates is likely to prevail until a new association has been formed and new rules adopted.

Robert Donahue, of Burlington, has made complaint against the Chicago, Burlington & Quincy and the Burlington, Cedar Rapids & Northern for not putting into effect the joint rates required by the Iowa law. If this comes to trial in the courts it will be a test to decide the question of the constitutionality of the law. The Iowa Commissioners have declined to unite with the roads in making a test case under the law, and the legal representatives of the lines will meet in this city Friday or Saturday to decide what further action shall be taken in the matter.

The rates announced by the Great Northern Line on a basis of 55 cents first class, New York to St. Paul, if maintained will seriously cripple the Chicago lines in competing for the business, as they will be practically shut out of this traffic. The traffic west of the Missouri river is also involved, as St. Paul gets the benefit of what is termed the St. Louis differential, which are 20, 20, 10, 5, 5, and 5 less on the six classes than the Chicago rate, which makes the through rate, via St. Paul, considerably less than can be made via Chicago under the present arrangements. The following table gives a comparison of the rates via Chicago and St. Paul:

New York to Missouri River, via Chicago	1.11	94	70	50	40	44
New York to Missouri River, via St. Paul	95	74	59	43	34	38
Difference, favor St. Paul	16	20	11	7	6	6

The Chicago, Milwaukee & St. Paul, Wisconsin Central, Chicago, St. Paul & Kansas City and Chicago Burlington & Northern have agreed to meet the present rail and lake rates via the northern ports to St. Paul in connection with the Lehigh Valley line. The rates are applicable only to the lines that agree to ignore the long and short haul clause of the law, and make through rates to St. Paul less than to intermediate points. The proportions west of Chicago are:

22	17	14	10½	8	7½
----	----	----	-----	---	----

The Chicago Committee of the Central Traffic Association have been unable to substantiate the charges made that some of the roads in its territory were cutting the rate on oats, and it is now announced that beginning on May 12, the Lake Shore & Michigan Southern will reduce the rate on oats from 25 cents to 22 cents, Chicago to New York.

The report which was current last week that 3d Vice-President Goddard of the Atchison had resigned owing to differences between himself and the present management is emphatically denied by Mr. Goddard.

The Chicago, Milwaukee & St. Paul officers have been disappointed in getting into their new offices here as contemplated and have moved only their traffic department from Milwaukee. This department has taken temporary offices in The Rookery building.

Northwestern Rates.

The Northern Steamship line and the Eastern Minnesota, beginning May 5, made a reduction of 16 cents in the rate from New York to St. Paul, introducing a rate 22 cents below the "Soo" line and 6 cents below the Central Vermont rates. The "Soo" line has, however, made another reduction, to go into effect May 7, and the tariff of the several lines now in effect from New York to St. Paul are:

	1	2	3	4	5	6
Northern Steamship Line	55	44	34	26	21	18
Other Lake Superior Lines	71	58	46	36	30	26
Central Vermont	61	50	40	32	27	24
"Soo" Line (rail)	61	49	38	29	23	19
All rail, non-differential	81	60	48	38	31	27
All rail, via differential routes	99	75	58	44	37	31

The Northern Steamship and Eastern Minnesota also announce the following canal, lake and rail rates from New York: 39, 30, 24, 22, 21, 16.

As we go to press it is announced that the Central Vermont is quoting lake and rail rates by way of Milwaukee to St. Paul of 45, 36, 28, 22, 17 and 15 cents.

Traffic Notes.

A Car Service Association has been formed at Philadelphia.

Senator Vest of Missouri has introduced a bill in the United States Senate to amend the Interstate Commerce law by providing that all express companies, whether incorporated or not, shall be placed under the provisions of that law.

The roads between Chicago and the Ohio River have, in connection with the Chesapeake & Ohio, reduced the through rate on provisions from Chicago to Newport News to 23 cents per 100 lbs. It has heretofore been 27 cents, the same as to Baltimore. (It is 30 cents to New York.)

Within the past few months the Southern Pacific has transported from Florida 150,000 orange trees for Los Angeles county, California. These have been planted at an average of about 75 trees to the acre, making 2,000 acres planted to oranges in Los Angeles County during the present season. The crop for next year promises to be much larger than ever before in the history of California.

Senator Hoar, of Massachusetts, has introduced a bill in the United States Senate making all corporations or persons engaged in transportation between the states liable to all their employees for any injury sustained by reason of negligence in the construction, equipment, or management of freight or passenger cars, unless the negligence of the person injured shall have contributed to such injury.

In consequence of the action of the vessel men in applying at the larger ports for loads very early in the season, before the ore shippers and others were ready for business and before navigation was fairly opened, the rates for all classes of lake traffic have been very low, and they are still far from stiff, though reports indicate a strong likelihood of improvement within a week or two. Corn has been taken from Chicago to Buffalo at 1½ cents per bushel in large quantities and ore from Escanaba to Ohio ports for less than 90 cents per ton.

The order of the Secretary of the Treasury, issued on the 25th of March, suspending the practice of cording and sealing of the baggage of passengers through Canada to Pacific coast points, has worked hardship to the Great Northern and the Northern Pacific routes. It has been found that the order, which was originally intended to prevent opium smuggling, is practically useless, while at the same time it is a discrimination against those roads. This state of things was communicated to Secretary Windom, who has now notified the Collector at St. Paul that the order is rescinded.

The Fitchburg road has made an important reduction in certain commutation ticket rates. The sale of 10-ride tickets is discontinued between Boston and Roberts, inclusive, and in lieu thereof a 12-ride ticket, at almost the same rate as the former 10-ride ticket, is placed on sale. The price of the 12-ride ticket between Boston and Waltham is \$1.25. The price for the 10-ride ticket has been \$1.50, so that the reduction is 25 per cent., and will make the rate about one cent per mile. The charge applies to all stations between Boston and Roberts, and the trip tickets are, we believe, used for all season passengers, after the manner followed by the Boston & Albany.

Party Rates Before the Courts.

The Interstate Commerce Commission has brought suit in the United States Court at Cincinnati to compel the Baltimore & Ohio to cease making one way party rates. On Feb. 21 the commission decided that the Baltimore & Ohio giving of special rates to parties was illegal, because it was a discrimination in favor of certain people and against the traveling public. The road was ordered to cease forthwith, and, further, to post its excursion rates and notify the commission according to law, but it has not complied with the order.

Cheap Rates for Dunkards.

The Missouri Pacific has issued a circular announcing a half rate from all points on its line to Warrensburg from May 20 to May 28, good to return up to and including June 25, upon the occasion of the Dunkards' annual meeting. The meeting is to be held at Pertle Springs. Exchange. The Dunkards, like drunkards, seem to prefer a sequestered spot. Who ever heard of Pertle Springs?

Comparison of Freight Traffic on Western and Eastern Roads.

Auditor S. Y. McNair, of the Interstate Commerce Railway Association, has sent to the Interstate Commerce Commission, in response to an inquiry in connection with the investigation of the reasonableness or unreasonableness of rates between the Rocky Mountains and the principal food-distributing centres of the East, a statement of the freight movement for the year 1888, showing the length of the respective roads named, the number of ton-miles, and the number of ton-miles per mile of road:

Eastern Lines.	Miles of road.	Thousands of ton-miles.	Thousands of ton-miles per mile of road.
Penn. Railroad (proper).....	1,395	4,114,093	2,970
N. Y. Cen. (inc. W. Sh.).....	1,421	2,754,778	1,938
N. Y. L. E. & W. (proper).....	1,096	2,250,878	2,054
Dal. Lack. & West.....	779	1,630,185	2,092
B. & O. (thru. to Chicago).....	1,774	2,180,802	1,229
L. S. & M. S.	1,342	1,790,104	1,340
Totals.....	7,747	14,759,851	1,905
Average.....			1,905
Western Lines.			
A. T. & S. F.	3,020	810,593	268
B. C. R. & N.	1,406	172,568	123
Chicago & Alton.....	849	533,866	628
C. M. & St. P.	5,665	1,690,228	298
C. R. I. & P. (excl. C. K. & N.).....	1,528	941,661	616
St. L. & S. F.	1,313	510,803	389
Chic. & Northwest.....	4,178	1,339,044	320
C. St. P., M. & O.	1,389	396,310	285
Missouri Pacific.....	1,336	609,910	456
M. & St. Louis.....	365	80,338	220
C. St. P. & K. C.	608	187,062	307
Totals.....	21,299	7,672,418	360
Average.....			360

The average of the Eastern lines is 5.29 times larger than that of the Western lines.

Cost per ton-mile, as per Interstate Commerce report for 1888:

Western Lines:	Cents.
Atchison, Topeka & Santa Fe.....	861
Burlington & B. M. in Nebraska.....	772
Chicago, Milwaukee & St. Paul.....	772
Chicago & Northwestern.....	561
Rock Island.....	644
Chicago, St. Paul & Kansas City.....	573
Chicago, St. Paul, Minneapolis & Omaha.....	664
Missouri Pacific.....	878
Sioux City & Pacific.....	1,168
Union Pacific.....	622
Chicago & Alton.....	602
Eastern Lines:	
New York Central.....	557
New York, Lake Erie & Western.....	435
Pennsylvania Railroad.....	501
Baltimore & Ohio.....	488
Lake Shore & Michigan Southern.....	411
Michigan Central.....	489

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, May 3, amounted to 80,108 tons, against 72,633 tons during the preceding week, an increase of 7,445 tons, and against 36,591 tons during the corresponding week of 1889, an increase of 43,517 tons. The proportions carried by each road were:

	Wk to Apr. 26.		Wk to May 3.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	8,431	11.6	9,625	12.0
Wabash.....	3,921	5.4	3,271	4.1
Lake Shore & Michigan South.....	13,162	18.1	14,186	17.7
Pitts., Ft. Wayne & Chicago.....	7,027	9.7	6,887	8.6
Chicago, St. Louis & Pitts.....	7,488	10.3	11,126	13.9
Baltimore & Ohio.....	4,142	5.7	5,910	6.2
Chicago & Grand Trunk.....	8,822	12.2	10,492	13.1
New York, Chic. & St. Louis.....	7,921	10.9	8,634	10.8
Chicago & Atlantic.....	11,719	16.1	10,577	13.6
Total.....	72,633	100.0	80,108	100.0

Of the above shipments 2,338 tons were flour, 40,233 tons grain, 2,333 tons millstuffs, 6,932 tons cured meats, 2,219 tons lard, 11,763 tons dressed beef, 1,252 tons butter, 1,617 tons hides, 136 tons wool and 7,532 tons lumber. The three Vanderbilt lines carried 40.5 per cent. of all the business, while the two Pennsylvania lines carried but 22.5 per cent.